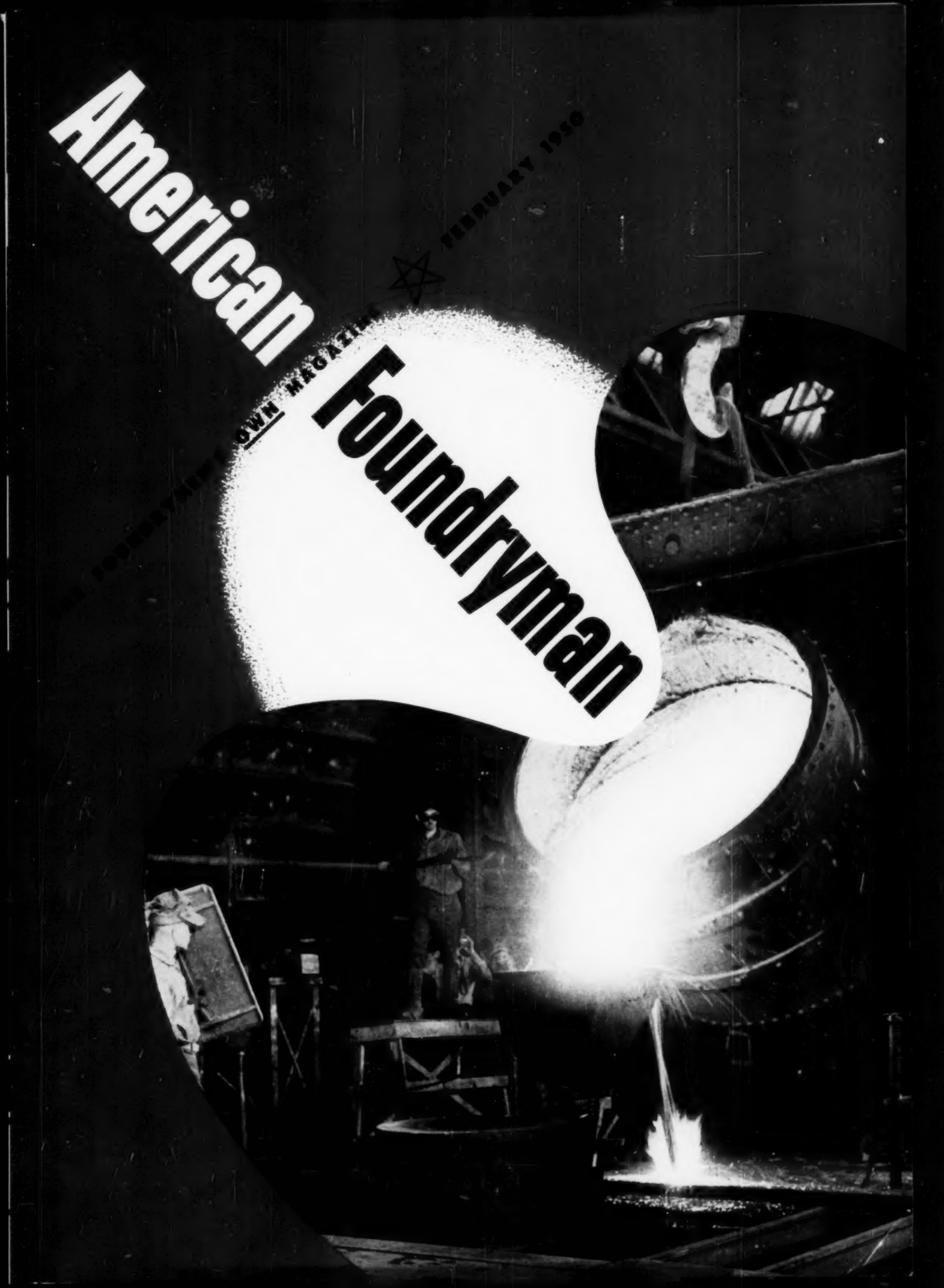
American Foundryman
OWN MAGAZINE
FEBRUARY 1950

A. F. S.

CONTENTS

VOLUME XVII, NUMBER 2

February, 1950

American Foundryman

Official publication of American Foundrymen's Society

Pouring a large iron mill roll through a single runner at the Mackintosh-Hemphill Co., Pittsburgh, one of the world's oldest and largest manufacturers of iron and steel mill rolls. In order to pour faster, iron rolls are poured from lip of ladle rather than through nozzle at bottom. Requiring faster pouring because it sets more quickly in chill mold, iron is poured for mill rolls at a rate of almost a ton per second.

Published monthly by the American Foundrymen's Society, Inc., 222 W. Adams St., Chicago 6. Subscription price in the United States, Canada and Mexico, $3.00 per year; international, $6.00; single copies, 50c. Entered as second class matter July 22, 1938, under act of March 3, 1879, at the Post Office, Chicago, Ill. The American Foundrymen's Society is not responsible for statements or opinions advanced by authors of papers printed in its publication. AMERICAN FOUNDRYMAN is indexed regularly by Engineering Index, Inc.

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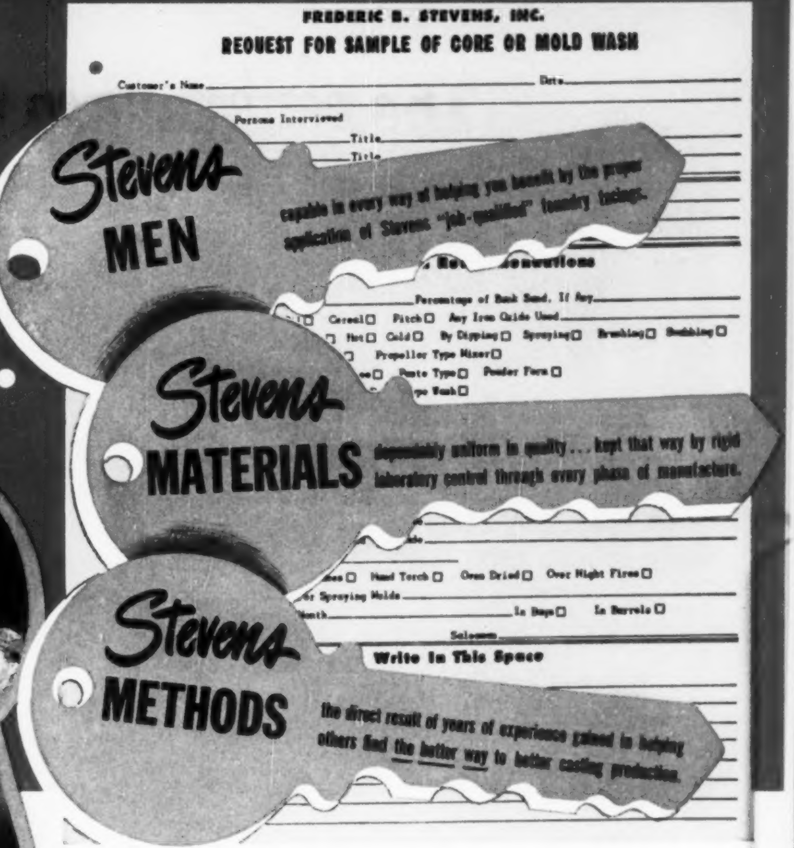

The textile machine drum shell casting made from the core and mold shown above had to possess a flawless finish inside and out to permit later machining under critical inspection standards. Stevens No. 125 Core Wash was found to be the key to the successful production of this difficult casting job.

THEY CAN HELP YOU OPEN THE DOOR TO IMPROVED CASTING PRODUCTION

The structure of any business if it is to endure, must be solidly built on a firm foundation of men, methods and materials. On this foundation, for more than half a century, Stevens has built carefully and effectively to qualify as *the* organization most capable of helping you improve your casting production through the use of better foundry facings.

Experienced, responsible foundrymen recognize this capability in their contact with a Stevens representative . . . by the manner in which he justifies his recommendation of a Stevens "job-qualified" foundry facing . . . by the manner in which he qualifies his request to our laboratory for a core or mold coating especially formulated to do the job.

When the recommended foundry facing is put to the test the capability with which it does the job is invariably reflected in a smoother, cleaner casting that requires but a minimum of tumbling, grinding or blasting.

As to Stevens methods . . . wise foundrymen have found that when they use and apply a Stevens foundry facing as recommended for the purpose intended, they can expect . . . and do get superior casting results.

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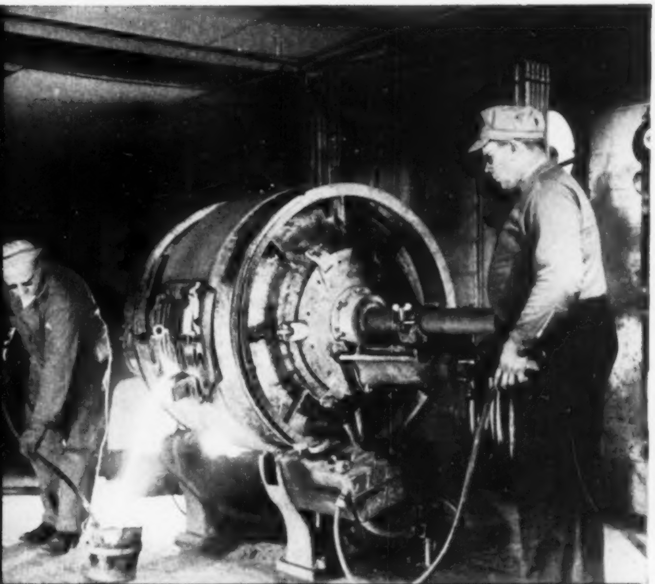
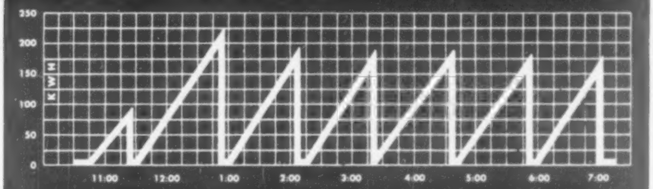
in 168,930 lbs. of synthetic alloy iron

A DETROIT ROCKING ELECTRIC FURNACE Melts Scrap with Economy and High Uniformity



No pigs were used in the production of 168,930 lbs. of uniform quality synthetic alloy iron by the Detroit Rocking Electric Furnace shown above. All charges were of scrap and graphite only.



One month's operation of type LFY, 175 KW, 700 lb. nominal cold charge capacity Detroit Rocking Electric Furnace. High strength, alloy automotive irons poured at 2800-3000° F.

• No. heats per day—7 • Av. heat weight—1000 lbs. • Total lbs. cold melted—168,930 • Av. power consumption, including preheat—549 KWH/ton • Total average cost for power, refractories, and electrodes, $11.41/ton.

NOTE: Operator handles two such furnaces all day. Furnaces are equipped with automatic electrode control as well as automatic rocking control.

Big savings were made on raw materials. Melt quality and homogeneity were rigidly maintained by automatic control.

Get Multiple Savings

In your melting operations, you'll achieve better castings, fewer rejects, higher usable yields with Detroit Rocking Electric Furnaces. Faster melts mean more heats per day.

Because the electrodes are always clear of the molten bath, carbon pick-up is eliminated. Indirect arc and automatic electrode adjustment result in optimum power use. All-electric operation excludes costs of handling and storing bulky fuels. Control of interior atmospheres assures peak quality.

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Increase YOUR Profits!

Whether you melt ferrous or non-ferrous metals, Detroit Rocking Electric Furnaces will give you top melting economies. Send us your production data. Our engineers will furnish facts on how you benefit through better quality control, greater production, with Detroit Rocking Electric Furnaces. Available with conical or cylindrical chambers, in capacities from 10 to 4000 lbs. Write, now, to:

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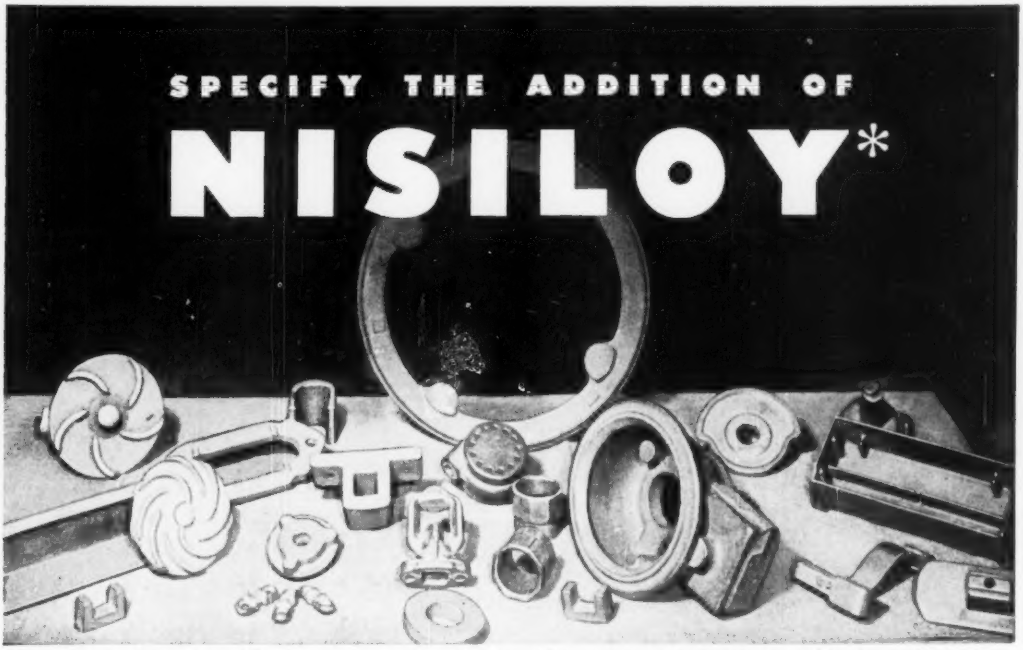

Chilling and consequent machining difficulties were encountered by a foundry specializing in cast parts like these, designed with both heavy and light sections. Nisiloy, added to the ladle, assured ready machinability after many other experiments failed.

for Better Machinability in GRAY IRON CASTINGS

Casting users profit from use of Nisiloy . . . a new, powerful, positive inoculant that promotes better machinability. It contains about 60 per cent nickel, 30 per cent silicon, balance essentially iron.

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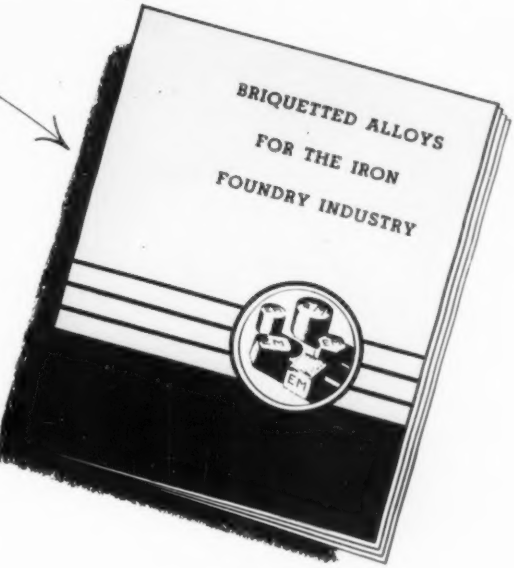
High-Quality Iron

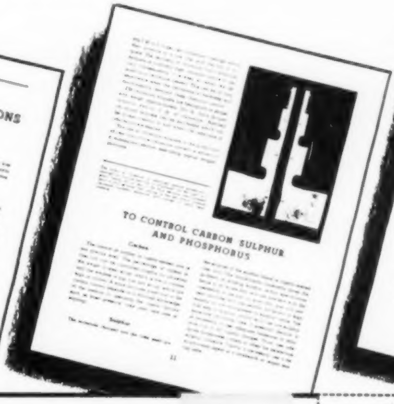
FREE BOOKLET TELLS HOW CUPOLA ADDITIONS OF ALLOYS IMPROVE FOUNDRY PRACTICE



This new booklet describes in detail:

- How ferro-alloys control the composition of iron and compensate for variations in raw materials.
- The beneficial effects of silicon, manganese, and chromium in cast iron.
- Advantages in using ferro alloy briquets.
- How to calculate the number of briquets to add to the charge.
- How to control carbon, sulphur, and phosphorus.
- Typical cupola charges for soft gray iron, high-strength iron, and low-chromium iron.

24 pages, including tables showing standard cupola charges and iron composition. A real help to all foundrymen.



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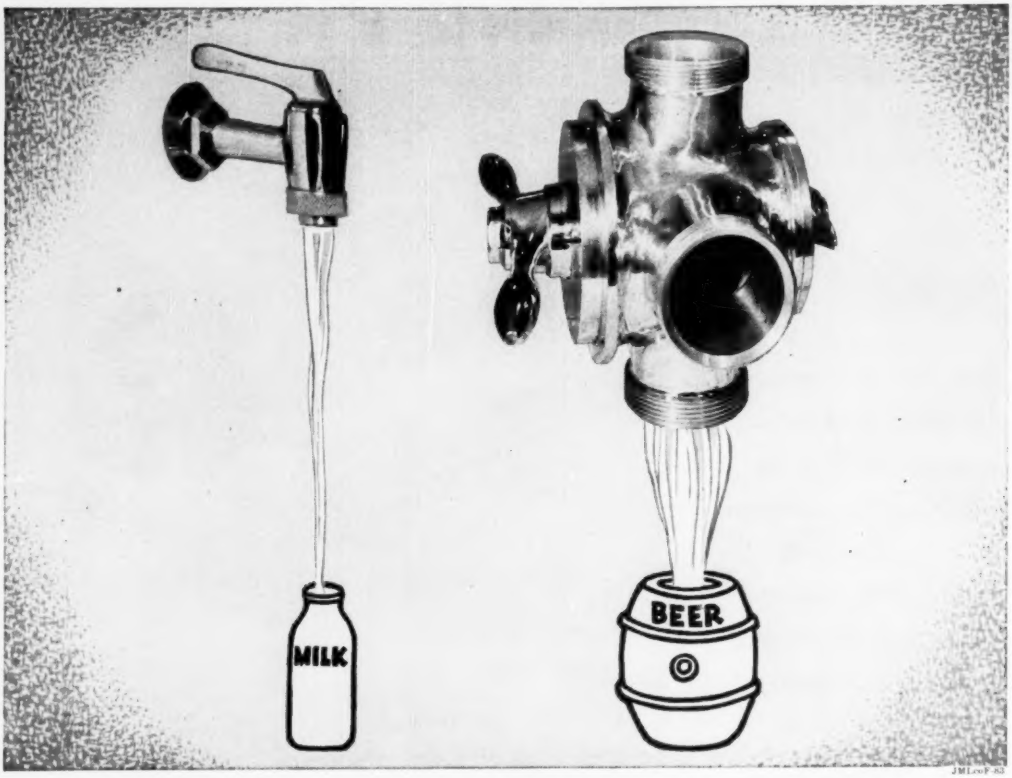

MILK
BEER

HOW WE LIVE

Improved Tools Increase Production

MAN CAN EXCHANGE his labor either for food, shelter, and comfort, or for tools. Because exchanging labor for tools reduces the food, shelter, and comfort of the individual making the exchange, many men prefer to exchange their labor for food, shelter, and comfort rather than for tools.

Those who deny themselves in order to acquire tools, eventually enjoy more comfort than those who consume all they produce, because the tools enable the owners to do more work in less time, or, if they wish, do work for them in the hands of other workers.

For example, a man who acquired a saw that greatly reduced the time and effort required to cut timber, had no trouble finding men who would gladly cut his timber for him in exchange for use of his saw.

Similarly in modern times, a man who acquires a stock of better tools has no trouble finding workers willing to use them because, with the aid of better tools, they can produce more and receive more.

The goods and services produced with the aid of the better tools can be sold to the customers at lower cost because their production uses fewer hours of work.

Even though the cost to the customer includes the payments for the use and wearing out of the tools, the cost is still below that of goods and services produced with the aid of old-fashioned tools.

Knowledge that the customer will pay for the use and wearing out of better tools, induces men to acquire better tools.

How "Work" Became "Employment"

In a society in which every man produced only for his own use and that of his dependents, there could be no enforced idleness which is now loosely called "unemployment."

Under these conditions his economic life was what he made it. His own material welfare and that of his dependents was determined by the quantity and quality of his energy and his tools.

His own needs and those of his dependents controlled and guided his work. If he was idle, it was either because he wanted nothing or because he chose to go without that which he wanted rather than expend energy to get it.

But as society developed and families lived in communities, men started to devote their energy to work they did best and to exchange their products with workers producing other goods and services.

Thus, a man with a talent for making shoes did nothing but make shoes. He did not have to spend time making other things because he could exchange part of what he made for the other things he needed.

Man gradually stopped producing only for himself and his dependents and began to exchange his work with other workers. Under these conditions it was other men's wants that controlled and guided his work. He was no longer his only "customer."

Unless other men were willing and able to "employ" (make use of) his labor, he could not be "employed."

The Customer is "Boss"

Much confusion has resulted from the fact that business managers are loosely referred to as "employers." This mistake leads to the incorrect conclusion that business managers (1) create employment and (2) fix labor payments.

This mistake also hides the fact that it is the customer who (1) creates employment through his purchases and (2) fixes the labor payments by the amount he is willing and able to pay.

All the workers (which includes the managers) are dependent on the willingness and ability of the customers to pay the cost arrived at by totalling the costs of the business.

Managers, if they are efficient managers, will not permit the customer to get more than he gives up, and—by getting more than he gives—impose upon workers a lower payment for their labor, and impose upon tool owners a lower payment for use of tools.

Workers, if they are intelligent workers, will not handicap managers by demanding labor payments greater than the customer is willing and able to pay.

If the customer cannot or will not buy, there can be no employment.

AMERICAN FOUNDRYMAN *this month makes an important deviation from its usual editorial policy to bring out some economic facts of life and to point to foundry publications which are doing likewise. Our editorial is from* How We Live *written by Fred G. Clark and Richard Stanton Rimanoczy and published by D. Van Nostrand Co., Inc., New York. Publication here is with their approval and the permission of the American Economic Foundation. We became acquainted with this discussion of the American economic system through* Foundryways, *employee publication of Belle City Malleable Iron Co. and Racine Steel Castings Co., Racine, Wis.* Family Circle, *Crouse-Hinds Co., Syracuse, N. Y., has been bringing the same message to employees of that company. We wonder how many other foundries are using this material to explain the basic economics which prevail in America's industrial system and should like to hear from those who are.*
—Editor.

54th A.F.S. FOUNDRY CONGRESS AND SHOW PLANS REACH FINAL STAGE

INDUSTRY-WIDE INTEREST in the 1950 A.F.S. Foundry Congress and Show, to be held May 8-12 in Cleveland, is indicated by the large number of foundry materials and equipment manufacturers and suppliers who have contracted for space at the 54th Foundry Congress. The list of firms who will exhibit at the Show (see opposite page) includes many companies who have never before exhibited their products at an A.F.S. Show, as well as regular exhibitors. More than three-fourths of the available exhibit space has already been sold, and a number of foundry equipment manufacturers have indicated that they will have operating exhibits at the 1950 Show. For the first time in 14 years, foundry equipment manufacturers will actually pour metal at an A.F.S. Show, and for the first time in many years, foreign firms will exhibit.

A tentative schedule of technical sessions and feature events for the 1950 Foundry Congress has already been set up. (AMERICAN FOUNDRYMAN, January, Page 23.)

Tentative program for the 1950 A.F.S. Foundry Congress and Show schedules in addition to five days of technical sessions such Convention highlights as Northeastern Ohio Day, Chapter Officers and Directors Dinner, round table luncheons, Canadian Dinner, Educational Dinner, the Annual Business Meeting and Charles Edgar Hoyt Lecture, the Annual Banquet, and the Gray Iron, and the Sand Shop Courses. New this year is the Non-Ferrous Shop Course, and the "Son-Father" dinner, the latter sponsored by the Non-Ferrous Founders' Society.

Featured event of the Convention's technical program will be the Charles Edgar Hoyt Annual Lecture, presented at the conclusion of the Annual Business Meeting, Wednesday, May 10. This year's lecturer will be W. W. Levi, Lynchburg Foundry Co., Lynchburg, Va., who will speak on *"Operation of the Cupola."* Other technical program highlights will be presentation of the 1950 Exchange Paper of the Institute of British Foundrymen, *"Aluminum Alloy Castings—A Review of British Achievements,"* by Frank Hudson, Mond Nickel Co., Ltd.; and the Exchange Paper of the French Foundry Technical Association, which will be presented by Jean Maurice Laine, Technical Secretary, French Foundry Technical Association.

The Aluminum & Magnesium Division's two-day program will feature four technical sessions on May 8 and 9, the Aluminum and Magnesium Round Table Luncheon on Monday, May 8; and participation in the Non-Ferrous Shop Course, held the evenings of May 8 and 9 and open to all foundrymen of the Cleveland area, as well as to Convention registrants. The Division's program will cover magnesium fluxing, fluid flow in transparent molds, high strength magnesium alloys, Canadian magnesium casting practices, and non-ferrous metal practice.

A.F.S. Brass & Bronze Division has scheduled four technical sessions on May 8 and 9, the annual Brass & Bronze Round Table Luncheon on May 9 and the new Non-Ferrous Shop Course.

Malleable Division's Convention schedule calls for

View of Cleveland, host city to the 54th A.F.S. Foundry Congress and Show, looking toward Municipal Auditorium, which will house the exhibits and technical sessions.

two technical sessions on Monday, May 8, one session Tuesday morning, the Malleable Round Table Luncheon Tuesday noon, and joint sponsorship with the Gray Iron Division of a symposium on nodular iron, Wednesday morning, May 10.

Gray Iron Division's program opens Wednesday morning, May 10, with the symposium on nodular iron held in conjunction with the Malleable Division, followed by the Gray Iron Round Table Luncheon. Technical sessions continue Thursday morning, May 11, and carry on through the final day of the Convention. The popular Gray Iron Shop Course—like all shop courses open to Cleveland foundrymen and Convention registrants—will be held at 8 p.m. the evenings of May 8, 9, and 11, and will cover pouring practices, bedding, and patching and lining.

Sand Division will hold technical sessions the mornings of May 9, 10, and 11 and the Sand Shop Course the evenings of May 8, 9, and 11. The Division will sponsor a meeting May 9 with the Steel Division.

Steel Division's technical program will open Thursday morning, May 11, and continue through Friday afternoon, and will feature the annual Steel Round Table Luncheon. Included in the program and jointly sponsored by the Sand Division will be a Symposium on Interpretation and Application of Sand Test Data for the Production of Quality Steel Castings.

Pattern Division's Convention schedule calls for a

Partial List of Exhibitors for 1950 Foundry Show

Accurate Match Plate Co., Inc.	Chicago, Ill.
The Adams Co.	Dubuque, Iowa
Aerodyne Development Corp.	Cleveland, Ohio
Air Reduction Sales Co.	New York, N. Y.
Ajax Electrothermic Corp.	Trenton, N. J.
Ajax Engineering Co.	Trenton, N. J.
Ajax Flexible Coupling Co.	Westfield, N. Y.
Ajax Metal Co.	Trenton, N. J.
Allis-Chalmers Mfg. Co.	Milwaukee, Wis.
Alloy Metal Abrasive Co.	Ann Arbor, Mich.
The Alpha-Lux Co., Inc.	New York, N. Y.
American Air Filter Co., Inc.	Louisville, Ky.
American Colloid Co.	Chicago, Ill.
American Crucible Co.	North Haven, Conn.
American Gas Association	New York, N. Y.
American Metal Market	New York, N. Y.
American Wheelabrator & Equipment Corp.	Mishawaka, Ind.
Apex Smelting Co.	Chicago, Ill.
The Asbury Graphite Mills, Inc.	Asbury, N. J.
Ayers Mineral Co.	Zanesville, Ohio
Bakelite Div., Union Carbide & Carbon Corp.	New York, N. Y.
Baroid Sales Div., National Lead Co.	Chicago, Ill.
C. O. Bartlett & Snow Co.	Cleveland, Ohio
Bay State Abrasive Products Co.	Westboro, Mass.
Beardsley & Piper Div., Pettibone Mulliken Corp.	Chicago, Ill.
Black Products Co.	Chicago, Ill.
Black, Sivalls & Bryson, Inc.	Kansas City, Mo.
Blaw-Knox Co.	Pittsburgh, Pa.
The Borden Co.—Chemical Div.	New York, N. Y.
British Moulding Machine Co. Ltd.	Faversham, Kent, England
Buckeye Products Co.	Cincinnati, Ohio
Campbell Hausfeld Co.	Harrison, Ohio
Canton Chaplet & Mfg. Co.	Canton, Ohio
The Carborundum Co.	Niagara Falls, N. Y.
Central Silica Co.	Zanesville, Ohio
Centrifugal Casting Machine Co.	Tulsa, Okla.
Chain Belt Co.	Milwaukee, Wis.
Champion Foundry & Machine Co.	Chicago, Ill.
Clearfield Machine Co.	Clearfield, Pa.
Cleco Div., Reed Roller Bit Co.	Houston, Tex.
The Cleveland Crane & Engineering Co.	Wickliffe, Ohio
The Cleveland Flux Co.	Cleveland, Ohio
The Cleveland Metal Abrasive Co.	Cleveland, Ohio
Cleveland Quarries Co.	Cleveland, Ohio
Cleveland Vibrator Co.	Cleveland, Ohio
Climax Molybdenum Co.	New York, N. Y.
L. A. Cohn & Bro., Inc.	Chicago, Ill.
Combined Supply & Equipment Co.	Buffalo, N. Y.
Conover Engineering Co.	Cleveland, Ohio
Corn Products Sales Co.	New York, N. Y.
D C M T Sales Corp.	New York, N. Y.
Davenport Machine & Foundry Co.	Davenport, Ia.
Dayton Oil Co.	Dayton, Ohio
Dayton Pneumatic Tool Co.	Dayton, Ohio
Delhi Foundry Sand Co.	Cincinnati, Ohio
Delta Oil Products Co.	Milwaukee, Wis.
Wm. Demmler & Bros.	Kewanee, Ill.
Detroit Electric Furnace Div.	
Kuhlman Electric Co.	Bay City, Mich.
Diamond Clamp & Flask Co.	Richmond, Ind.
Joseph Dixon Crucible Co.	Jersey City, N. J.
Harry W. Dietert Co.	Detroit, Mich.
DoAll Cleveland Co.	Cleveland, Ohio
Dougherty Lumber Co.	Cleveland, Ohio
Eastern Clay Products, Inc.	Jackson, Ohio
Eastman Kodak Co.	Rochester, N. Y.
Economy Tool & Machine Co.	Muskegon, Mich.
Electro Metallurgical Div.	
Union Carbide & Carbon Corp.	New York, N. Y.
Electro Refractories & Alloys Corp.	Buffalo, N. Y.
Exomet, Inc.	Conneaut, Ohio
Exothermic Alloys Sales & Service, Inc.	Chicago, Ill.
The Fanner Mfg. Co.	Cleveland, Ohio
The Federal Foundry Supply Co.	Cleveland, Ohio
Federated Metals Div.	
American Smelting & Refining Co.	New York, N. Y.
Fisher Furnace Div.	
Lindberg Engineering Co.	Chicago, Ill.
The Foundry, Penton Publishing Co.	Cleveland, Ohio
Foundry Equipment Co.	Cleveland, Ohio
Foundry Educational Foundation	Cleveland, Ohio
Foundry Equipment Ltd.	Bedfordshire, England
Foundry Service Co.	Birmingham, Ala.
Fox Grinders, Inc.	Pittsburgh, Pa.
Foxboro Co.	Foxboro, Mass.
The Freeman Supply Co.	Toledo, Ohio
The Fremont Flask Co.	Fremont, Ohio
General Electric X-Ray Corp.	Milwaukee, Wis.
Girdler Corp., Thermex Div.	Louisville, Ky.
Gray Iron Founders' Society, Inc.	Cleveland, Ohio
Great Lakes Carbon Corp.	Niagara Falls, N. Y.
Great Lakes Foundry Sand Co.	Detroit, Mich.
Great Western Mfg. Co.	Leavenworth, Kan.
Samuel Greenfield Co., Inc.	Buffalo, N. Y.

Harbison-Walker Refractories Co.	Pittsburgh, Pa.
Harnischfeger Corp.	Milwaukee, Wis.
Benj. Harris & Co.	Chicago, Ill.
Harrison Machine Co.	Erie, Pa.
Hercules Powder Co.	Wilmington, Del.
Herman Pneumatic Machine Co.	Pittsburgh, Pa.
Hewitt-Robins, Inc. Robins Conveyors Div.	New York, N. Y.
Hickman, Williams & Co.	Cleveland, Ohio
Hill & Griffith Co.	Cincinnati, Ohio
The Hoffman Foundry Supply Co.	Cleveland, Ohio
Hines Flask Co.	Cleveland, Ohio
Frank G. Hough Co.	Libertyville, Ill.
E. F. Houghton & Co.	Philadelphia, Pa.
Hougland & Hardy, Inc.—Hardy Sand Co.	Evansville, Ind.
Hydro Blast Corp.	Chicago, Ill.
Illinois Clay Products Co.	Chicago, Ill.
Illinois Testing Labs., Inc.	Chicago, Ill.
Industrial Fabricating, Inc.	Eaton Rapids, Mich.
Industrial Minerals Co.	Lancaster, Ohio
Ingersoll-Rand Co.	New York, N. Y.
International Graphite & Electrode Corp.	St. Marys, Pa.
International Molding Machine Co.	LaGrange Park, Ill.
International Nickel Co., Inc.	New York, N. Y.
The Iron Age	New York, N. Y.
Iron Lung Ventilator Co.	Cleveland, Ohio
Jeffrey Mfg. Co.	Columbus, Ohio
The Kindt-Collins Co.	Cleveland, Ohio
Andrew King	Narberth, Pa.
Lester B. Knight & Associates	Chicago, Ill.
Wm. Korn, Inc.	New York, N. Y.
H. Kramer & Co.	Chicago, Ill.
Laboratory Equipment Corp.	St. Joseph, Mich.
Lava Crucible Co. of Pittsburgh	Pittsburgh, Pa.
Link-Belt Co.	Chicago, Ill.
J. S. McCormick Co.	Pittsburgh, Pa.
The Macleod Co.	Cincinnati, Ohio
Magnaflux Corp.	Chicago, Ill.
Manley Sand Co.	Rockton, Ill.
Martin Engineering Co.	Kewanee, Ill.
Martindale Electric Co.	Cleveland, Ohio
Master Pneumatic Tool Co., Inc.	Cleveland, Ohio
Mathews Conveyers Co.	Ellwood City, Pa.
Metallizing Co. of America	Chicago, Ill.
Mexico Refractories Co.	Mexico, Mo.
Michigan Smelting & Refining Div. Bohn Aluminum & Brass Corp.	Detroit, Mich.
Millwood Sand Co.	Zanesville, Ohio
Minco Products Corp.	Saginaw, Mich.
Mine Safety Appliances Co.	Pittsburgh, Pa.
Modern Equipment Co.	Port Washington, Wis.
The Monk Tool Co.	Geneva, Ill.
The Moulders' Friend	Dallas City, Ill.
Nassau Smelting & Refining Co.	Staten Island, N. Y.
National Carbon Div. Union Carbide & Carbon Corp.	New York, N. Y.
National Crucible Co.	Philadelphia, Pa.
National Engineering Co.	Chicago, Ill.
National Foundry Assn.	Chicago, Ill.
Newaygo Engineering Co.	Newaygo, Mich.
New Jersey Silica Sand Co.	Millville, N. J.
Niagara Falls Smelting & Refining Div. Continental Copper & Steel Industries, Inc.	Buffalo, N. Y.
Wm. H. Nicholls Co., Inc.	Richmond Hill, N. Y.
Nichols Engineering & Research Corp.	New York, N. Y.
North American Smelting Co.	Wilmington, Del.
Norton Co.	Worcester, Mass.
S. Obermayer Co.	Chicago, Ill.
Oliver Machinery Co.	Grand Rapids, Mich.
The Osborn Mfg. Co.	Cleveland, Ohio
P M S Co.	Cleveland, Ohio
Pangborn Corp.	Hagerstown, Md.
Peninsular Grinding Wheel Co.	Detroit, Mich.
Penola Inc.	Detroit, Mich.
George F. Pettinos, Inc.	Philadelphia, Pa.
Pittsburgh Crushed Steel Co.	Pittsburgh, Pa.
Pittsburgh Lectromelt Furnace Corp.	Pittsburgh, Pa.
Precision Grinding Wheel Co., Inc.	Philadelphia, Pa.
Pyrometer Instrument Co., Inc.	Bergenfield, N. J.
N. Ransohoff, Inc.	Cincinnati, Ohio
The Ready-Power Co.	Detroit, Mich.
Redford Iron & Equipment Co.	Detroit, Mich.
Reliable Castings Corp.	Cincinnati, Ohio
Republic Coal & Coke Co.	Chicago, Ill.
H. H. Robertson Co.	Pittsburgh, Pa.
Robinson Clay Products Co.	Akron, Ohio
Rockwell Mfg. Co. Power Tool Div.	Milwaukee, Wis.
Root-Connersville Blower Corp.	Connersville, Ind.
Ross-Tacony Crucible Co.	Philadelphia, Pa.
The Rotor Tool Co.	Cleveland, Ohio
Royer Foundry & Machine Co.	Kingston, Pa.
Safety Clothing & Equipment Co.	Cleveland, Ohio
Safety First Shoe Co.	Holliston, Mass.
Sand Products Corp.	Cleveland, Ohio
Claude B. Schneible Co.	Detroit, Mich.
Schramm Inc.	West Chester, Pa.
A. Schrader's Son Div. Scovill Mfg. Co., Inc.	Brooklyn, N. Y.
Scientific Cast Products Corp.	Cleveland, Ohio
Semet-Solvay Div., Allied Chemical & Dye Corp.	New York, N. Y.
Severance Tool Industries, Inc.	Saginaw, Mich.
Service Caster & Truck Corp.	Albion, Mich.
Simonds Abrasive Co.	Philadelphia, Pa.
Simplicity Engineering Co.	Durand, Mich.
W. W. Sly Mfg. Co.	Cleveland, Ohio
Werner G. Smith Co.	Cleveland, Ohio
Smith Facing & Supply Co.	Cleveland, Ohio
Smith Oil & Refining Co.	Rockford, Ill.
Smith & Richardson Mfg. Co.	Geneva, Ill.
Sorbo-Mat Process Engineers	St. Louis, Mo.
Spencer Turbine Co.	Hartford, Conn.
SPO Inc.—Milwaukee Foundry Equipment Div.	Cleveland, Ohio
Standard Conveyor Co.	No. St. Paul, Minn.
Standard Horse Nail Corp.	New Brighton, Pa.
Steel Shot Producers, Inc.	Butler, Pa.
Sterling Wheelbarrow Co.	Milwaukee, Wis.
Frederic B. Stevens, Inc.	Detroit, Mich.
Stoller Chemical Co.	Akron, Ohio
Stroman Furnace & Engineering Co.	Franklin Park, Ill.
Swan-Finch Oil Corp.	New York, N. Y.
Syntron Co.	Homer City, Pa.
Tabor Mfg. Co.	Philadelphia, Pa.
Taggart Brimfield Co.	Hammonton, N. J.
Tamms Industries, Inc.	Chicago, Ill.
Thiem Products, Inc.	Milwaukee, Wis.
Tincher Products Co.	Sycamore, Ill.
Titanium Alloy Mfg. Div., National Lead Co.	New York, N. Y.
Toledo Scale Co.	Toledo, Ohio
Towmotor Corp.	Cleveland, Ohio
United Oil Mfg. Co.	Erie, Pa.
U. S. Graphite Co., Div. of the Wickes Corp.	Saginaw, Mich.
U. S. Gypsum Co., Ind. Sales Div.	Chicago, Ill.
U. S. Rubber Co.	New York, N. Y.
U. S. Hoffman Machinery Corp.	New York, N. Y.
Vanadium Corp. of America	New York, N. Y.
Velsicol Corp.	Chicago, Ill.
Vesuvius Crucible Co.	Pittsburgh, Pa.
White Pine Lumber Co.	Chicago, Ill.
Whitehead Brothers Co.	New York, N. Y.
Whiting Corp.	Harvey, Ill.
Zanesville Sand Co.	Zanesville, Ohio

technical session the afternoon of May 9 and the Pattern Round Table Luncheon at noon on May 10.

Educational Division's program includes one technical session Tuesday afternoon, May 9, and the annual Educational Dinner that evening, which will feature Norman J. Stickney of the University of Wisconsin speaking on "*Summer Placement in the Foundry Industry.*"

Other technical meetings scheduled for the 1950 Foundry Congress and Show are a session on Heat Transfer Tuesday morning, May 9; a Refractories session the morning of May 10; a joint session of the A.F.S. Time Study & Methods and Cost Committees on management functions and controls Thursday morning, May 11; a Time Study & Methods meeting the afternoon of May 11; and two sessions sponsored by the Plant and Plant Equipment Committee the afternoon and evening of May 11; a meeting on precision casting May 8; and on foundry cost methods May 11.

Last day for entries in the 1950 A.F.S. Apprentice Contest is March 10. Judging will take place in Cleveland shortly afterwards. First place winners in the five Contest divisions—Gray Iron Molding, Non-Ferrous Molding, Steel Molding, Wood Patternmaking and Metal Patternmaking (new this year) will have their round trip rail fare paid to the Convention, where they will receive $100 prizes.

Name Host Committee Chairmen

A.F.S. Northeastern Ohio Host Chapter Convention committee chairmen are:

Reception: chairman, Cleve H. Pomeroy, National Malleable & Steel Castings Co.; vice-chairman, Walter L. Seelbach, Superior Foundry, Inc.

Northeastern Ohio Day: chairman, John A. Sharritts, Westinghouse Electric Corp.; vice-chairman, Leslie Schuman, National Malleable & Steel Castings Co.

Plant Visitations: chairman, Lewis T. Crosby, Sterling Wheelbarrow Co.; vice-chairman, John Schneider, Cleveland Electric Illuminating Co.

Shop Courses: chairman, National Director Vincent J. Sedlon, Master Pattern Co.; vice-chairman, Maurice F. Degley, Ferro Machine & Foundry Co.

Banquet: chairman, Gilbert J. Nock, Nock Fire Brick Co.; vice-chairman, Russell F. Lincoln, Russell F. Lincoln & Co.

Ladies' Entertainment: chairman, Mrs. Frank G. Steinebach; vice-chairman, Mrs. Gilbert J. Nock.

Publicity: chairman, Robert H. Herrmann, Penton Publishing Co.; vice-chairman, Sterling N. Farmer, Sand Products Corp.

As previously announced, members of the host chapter's General Committee are: honorary chairman, A.F.S. National Vice-President Walton L. Woody; chairman, Wm. G. Gude, Penton Publishing Co.; vice-chairman, Fred J. Pfarr, Lake City Malleable Co.; secretary, A. J. Harlan, Hickman, Williams & Co.; treasurer, F. Ray Fleig, Smith Facing & Supply Co.; W. E. Sicha, Aluminum Co. of America; H. C. Gollmar, Elyria Foundry Division; and H. J. Trenkamp, Ohio Foundry Co. Complete personnel of these committees will be announced in a future issue of AMERICAN FOUNDRYMAN.

Situated on a lagoon and surrounded by a park, Cleveland's Art Museum is one of the city's many interesting, beautiful attractions.

Central Pennsylvania Foundrymen Discuss Nodular Iron At Meeting

THIRD MEETING of the Central Pennsylvania Foundrymen's Group, nucleus of a proposed A.F.S. Central Pennsylvania Chapter, was held November 30 in the School of Mineral Industries, Pennsylvania State College and featured a talk by D. E. Krause, executive director, Gray Iron Founders' Society, Cleveland, Ohio, on the development, potential industrial applications and properties of nodular iron.

Mr. Krause cited nodular iron as an example of metallurgy in the ladle and spoke of variations in temperature and sulphur content. He contrasted effects of treating iron with magnesium for strength with strengthening iron by lowering carbon equivalent or adding true alloying elements.

After discussing the various additives used in making nodular iron, Mr. Krause compared the properties of nodular iron with Class 40 gray iron, acicular cast iron, and Grade B cast steel. The speaker concluded by stating that nodular iron will probably replace some malleable and steel castings, particularly in heavier sections.

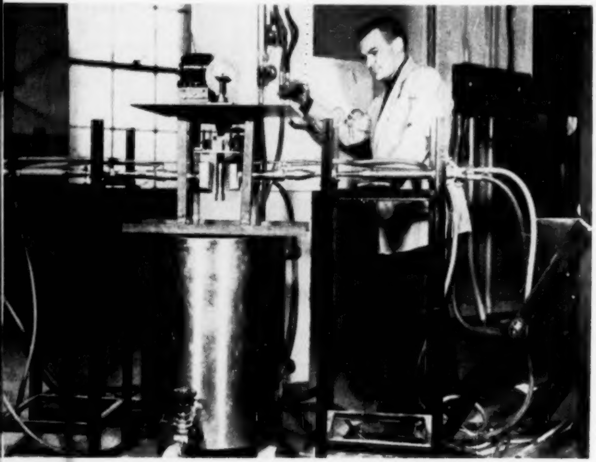
The meeting concluded with a discussion during which the audience examined typical fractures of gray iron and nodular iron.

Prof. R. W. Lindsay, Pennsylvania State College, who is chairman of the group, presided.

END FIRST MALLEABLE RESEARCH PROJECT
PLAN CONVENTION TALKS ON INVESTIGATIONS

CONCLUSION of the A.F.S. Malleable Research Project was announced January 17 when the Malleable Division's Research Committee met at the University of Michigan to discuss final reports. The project—one of nine in which the Society participates—was initiated approximately two years ago to determine the most desirable microstructure for pearlitic malleable iron castings which are to be selectively hardened.

Presentation of the final report in the project will be made at a malleable iron session of the 1950 A.F.S. Foundry Congress and Show, Cleveland, May 8-12.



Pearlitic malleable iron is flame hardened (below) and induction hardened on the Malleable Research Project studying best microstructure for surface hardening.

Other Society-sponsored research on which Convention progress reports are expected are:

Hydraulics of Light Metal Flow into Molds—Research Committee, Aluminum and Magnesium Div.

Fracture Test as an Index of Melt Quality—Research Committee, Brass and Bronze Division.

Influence of Heredity on Coke Behavior in the Cupola—Cupola Research Committee.

Fundamentals of Heat Flow During Casting Solidification—Heat Transfer Committee.

High Temperature Properties of Molding Sands—Research Committee, Sand Division.

Work on the Malleable Research Project was done at the University of Michigan on commercial irons in current use. Sources of test material represent a wide range of chemical composition, melting practice, and heat treatment. Each source furnished approximately 100 bars in the hard iron and in the heat treated condition. As cast the bars are 1 3/16 in. in diameter and 8 in. long. The heat treated bars are machined to 1 in. in diameter and surface hardened.

Hardening has been done following heating by high frequency induction and by oxy-acetylene flame. Varying times and rates of heating and other variables have been studied, together with various quenching media. A complete study of the hardness-microstructure relationships has been made.

New project proposed by the Malleable Division Research Committee and approved by the Board of Directors January 27 is "a fundamental laboratory study of the effect of melting condition and particularly atmosphere above the melt, and the relation to the behavior of the resulting white iron." It is hoped this research will disclose reasons for some of the difficulties encountered in the production of malleable iron.

Meeting at the University of Michigan the day before the Malleable Research Committee, members of the Brass and Bronze Division's Research Committee met to discuss their project. Long range object of the investigation is to relate the characteristics of the fracture of 85-5-5-5 bronze to other properties of the metal.

Latest A.F.S. Publications Fill Gaps In Society's Foundry Library Series

TWO OF THE THREE new A.F.S. publications recently released fill the need for authoritative information on foundry core practice and on foreman training. The third—to be distributed to educational institutions and research laboratories—outlines foundry research projects adaptable to college research laboratories. It is expected to increase the amount of research on foundry problems and lists a number, all with solutions of commercial foundry interest.

FOUNDRY CORE PRACTICE, second edition of the popular MODERN CORE PRACTICES AND THEORIES, is a thorough revision of the original book published by A.F.S. in 1942. With new chapters on such topics as electronic core baking as well as up-to-date versions of older practices and theories, FOUNDRY CORE PRACTICE brings together in a single publication the best current information on every phase of core production, use, equipment, mixtures, sand, binders, etc. Much of this valuable information is not available elsewhere.

Author of the first edition, Harry W. Dietert, Harry W. Dietert Co., Detroit, made the revision with the cooperation of several members of Society technical committees. Assisting with the revision were H. Ries, chairman, Sand Division; Elmer C. Zirzow, John Deere & Co. Moline, Ill.; J. A. Rassenfoss, American Steel Foundries, East Chicago, Ind.; and H. M. St. John, Crane Co., Chicago.

GUIDE FOR FOREMAN TRAINING CONFERENCES stresses the human relations characteristics paramount in successful, everyday, sound employee-management relationships and brings out the economics of the free enterprise system. It is a useful manual for improving the effectiveness of first-line foremen.

GUIDE FOR FOREMAN TRAINING was developed and approved by Donald F. Lane, formerly with Bethlehem Steel Co., Sparrows Point, Md., and the A.F.S. Educational Division's Foreman Training Committee. Now director of training, Lever Brothers Co., New York, Mr. Lane is chairman of the committee.

HOW TO USE PHENOLIC CASTING RESINS FOR PATTERN COATINGS

E. J. McAffee
Master Patternmaker
Puget Sound Naval Shipyard
Bremerton, Wash.

A SEARCH for a universally satisfactory pattern coating has been in progress since the time man found it necessary and practical to use patterns in order to produce multiple castings having the same proportions and dimensions. Materials of all kinds have been used in the manufacture of patterns, and proper coatings for these various materials are required.

Among the important purposes of a pattern coating are: producing a smooth surface to permit ready drawing of the pattern from the mold; protecting the pattern from moisture and heat absorption and subsequent dimensional change and distortion while in the mold; protecting the pattern against temperature change and weather during storage; protecting the pattern surface against sand to permit long molding runs and minimize refinishing costs.

The thinner used to suspend the pigments of the coating must be such that it will evaporate quickly, leaving a smooth, hard surface, making the pattern available in a short time for use in the foundry or for the application of another coating.

Prior to the last war shellac was largely used for coating in our pattern shop. It was not entirely satisfactory as under certain conditions the coatings softened when in contact with the green sand, permitting the wood patterns to absorb moisture and causing mold tears upon withdrawal of the pattern from the mold.

Various types of shellac substitutes and pattern coatings were investigated at this time, and one product was found to be fairly satisfactory. During the war the quality of this particular product was not maintained, possibly due to the inability of the manufacturer to obtain the proper ingredients.

During our early experiments in the production of plastic patterns from the phenolic resins, we found that this material was the only one suitable for making patterns that did not require a coating for pattern preservation or for ease of withdrawal from the sand. These qualities were due to the porcelain-like surface of the resin and its resistance to moisture absorption.

These same phenolic casting resins can also be prepared as a pattern coating which has all the attributes desired except the time required for application, and that it cannot be applied to metal patterns.

Certain acids contained in the catalyst or accelerator have an etching effect upon non-ferrous metals when the phenolic resin is applied as a coating, and release oxygen when applied to ferrous metals. An undercoat such as acid-resistant paint has been used as an insulator between the metal and resin, but it has not proved entirely satisfactory.

The plastic material is ideal for wood patterns, especially those receiving hard usage. We have used many patterns coated with the material in more than 1000 molds without refinishing being required. Patterns to be coated must be manufactured from well-seasoned lumber, and then be prepared as for any conventional type of coating, i.e., properly filleted and

This U. S. Navy photograph shows a plastic pattern mounted on a machine board made of poplar wood. Three coats of clear plastic were applied to both pattern and board, no filler coat being used. The pattern equipment has produced about 500 castings, with the only apparent abrasion occurring on the board at point of flask contact.

sanded with nail holes and cracks puttied. Beeswax or other waxes must not be used.

A filler or undercoat is desirable before applying the plastic. The filler coat consists of a brushing and spraying type of lacquer, with the coloring pigment ground in. As the resin coating is a clear material and difficult to color, especially so when an opaque finish is desired, it was found more practicable to add the desired coloring to the prime or filler coat.

Mix Color in Undercoat

A satisfactory red filler or prime coat can be obtained by grinding in 1½ lb of toluidine red dry pigment for every gallon of lacquer. Yellow and other colors desired may be made in a similar manner.

Shellac must not be used as an undercoat, as it will blister under the temperature required during the curing cycle of the plastic coatings. The pattern should be given one filler coat and dried for a few minutes, preferably in a ventilated oven at a temperature not over 140F to insure the escape of all fumes.

The pattern may then be sanded to receive the plastic coats. In preparing the plastic resin as a coating material, the quantity of phenolic casting resin required is about 50 per cent of the volume of coating mixture. To this resin add twice the amount of catalyst as recommended by the resin manufacturer for casting purposes, i.e., if 8 per cent catalyst is recommended for casting purposes, then 16 per cent of catalyst by weight should be used for the coating. The catalyst should be thoroughly mixed with resin.

A thinner for the coating mixture consists of equal amounts by weight of ethyl acetate, butyl alcohol, ethyl alcohol, and methyl ethyl ketone. A denatured grain alcohol may be used alone as a thinner, but it is not as effective as a combination of the four ingredients mentioned, and its use is not recommended.

The combined thinners equal to the weight of the resin should be added and thoroughly mixed. This will produce a coating that can be easily applied with a brush. If kept in a sealed container, this mixture can be used over a period of 2 to 3 weeks before it becomes unfit for use through the chemical action caused by the catalyst.

Two or three coats are ordinarily applied, but any number found desirable may be used. Each coat must be air dried to the touch of the hand, and then oven baked at a temperature of 140F for 2 hrs, before the application of a subsequent coat. Otherwise, a good cure cannot be obtained. If properly seasoned lumber has been used in the pattern construction, these short periods in the oven will have no ill effects.

Plastic Coating Withstands Severe Usage

Wood patterns coated with the plastic have been used under the most adverse foundry conditions, such as being left in the mold for 3 or 4 days, or rammed up in hot sand, without damage to the pattern.

The time required for application and curing is the only undesirable feature of the resin coating, particularly in jobbing work where only one or two castings are wanted. On the other hand, it will prolong the life of a wood pattern used for production molding far beyond the ordinary expectancy.

Plastic coating will permit the use of wood patterns in many cases where more costly metal patterns are now required. As the time the pattern is subjected to contact with the molding sand has no ill effect either on the pattern or the mold, a pattern may be left in the sand at the end of the work shift, even though it be over the week end. Such treatment is a real test of the effectiveness of any pattern coating.

The resin coating may also be used to great advantage on plastic patterns as it imparts a high glaze to the surface, not obtainable by other means. When applied to patterns mounted upon machine boards the coating will produce a minute fillet between the mounted pattern and board, effectively preventing the adherence of fine sand grains at these points.

Unique Method Of Adding Tellurium Gives Surface-Hard Iron Castings

When the customary methods of adding tellurium to gray iron gave unsatisfactory results, A. P. Alexander, International Harvester Co., Memphis, Tenn., merely placed tellurium powder at the bottom of the sprue where the iron would pick it up as it flowed through the gating system. Object of the technique, reported in the August, 1949, issue of *Materials & Methods*, pages 58-59, was to stabilize carbides sufficiently to produce a 5/32 in. chill in portions of the part cast against a chill.

Analysis of the iron (TC, 3.20-2.40, Si, 2.00-2.15 per cent) could not be changed conveniently, flame hardening provided insufficient hardness, induction hardening couldn't be accomplished in one pass, and deep hardening was undesirable because of resulting embrittlement. A chill alone gave insufficient hardness. Tellurium burned out of the ladle rapidly and when an excess was added the chill could not be localized. Painting the mold or the chill with a tellurium wash gave good results but castings lacked uniformity.

Satisfactory results were obtained by placing a small dipper of tellurium powder—amount determined by experiment—in a small depression at the sprue foot.

Few *Transactions* Still Available

Completion of mailing of the 1949 Transactions of A.F.S., Vol. 57, in November left a few copies which are still available on postpublication order. Original mailing of the 700-page volume was based on prepublication requests. Containing a record of the business transactions of the Society and the papers and discussions presented at the 1949 Annual A.F.S. Convention in St. Louis, the huge volume reports also the progress on the various Society-sponsored research projects and includes the exchange papers to and from the foundrymen of England, France, and Australia.

The 61 papers of Transactions for 1949 cover the entire field of foundry practice and technology and report many new ideas and new applications of old principles.

Orders are still being accepted at the A.F.S. member price of $8.00 (prepublication member price was $6.00) and the non-member price of $15.00. Postage is paid if remittance accompanies order. Orders should be sent to American Foundrymen's Society, 222 W. Adams St., Chicago 6, Ill.

NAME 1950 AWARD WINNERS

C. H. Lorig

R. Schneidewind

Two Gold Medals and three Honorary Life Memberships in the Society will be presented at the 1950 Convention and Foundry Show of A.F.S. in Cleveland, May 8-12. Selected by the Board of Awards December 8 and approved by the National Officers and Directors at their mid-year meeting January 27, the awards are:

Joseph S. Seaman Gold Medal—to Clarence H. Lorig, Battelle Memorial Institute, Columbus, Ohio.

Wm. H. McFadden Gold Medal—to Richard Schneidewind of the University of Michigan, Ann Arbor, Mich.

Honorary Life Memberships to Clyde L. Frear, U. S. Navy, Bureau of Ships, Washington, D. C.; R. L. Lee, General Motors Corp., Detroit; and E. W. Horlebein, President of the American Foundrymen's Society.

C. L. Frear

The Board of Awards recommends presentation of the Joseph S. Seaman Gold Medal to Dr. Lorig *"for his many contributions to foundry metallurgy and for his constant stimulation of research in the cast metals field."*

E. W. Horlebein

Dr. Schneidewind has been designated to receive the Wm. H. McFadden Gold Medal *"for his valuable contributions to the malleable iron industry in connection with the graphitization of white cast iron and for his many contributions to the Society and the metal castings industry."*

R. L. Lee

In recognition of *"his long-time contributions to the Society and for his work in coordinating the casting processes with Naval requirements,"* Mr. Frear will be made an Honorary Life Member. Mr. Lee will be similarly honored *"for his philosophical approach to the problems of the foundry industry and for his stimulation of pride of craftsmanship among foundrymen."* Third Honorary Life Member is A.F.S. President E. W. Horlebein who will be so honored on completion of his present term.

Dr. Lorig has long played an important role in advancing the foundry industry through active participation in A.F.S. and allied societies, by performing and directing foundry research, and disseminating information through numerous talks, some 50 technical papers, a book, and five patents. Assistant director of Battelle Memorial Institute, he has been professor of mechanical engineering at Drexel Institute and metallurgical research engineer at the University of Wisconsin where he also did graduate work.

He has been metallurgist for several foundries and metal working concerns. Dr. Lorig is a member of the A.F.S. Publications Committee, the Steel Division Research and Executive Committees, the Gray Iron Division Advisory Group, and is a former chairman of the Steel Division of the Society. He holds membership in several foreign and American metals and metallurgical organizations.

Richard Schneidewind

Contributions of Dr. Schneidewind have been in the fields of research, education, industry, and consultation. A professor of metallurgical engineering at the University of Michigan—where he started teaching in 1937—he studied at Detroit Junior College (Wayne University), the University of Chicago, and University of Michigan where he graduated in chemical engineering in 1923. He was plant chemist for the Studebaker Corp., Detroit, and for 13 years prior to

joining the academic staff at Michigan he conducted research for the school on malleable and gray irons, electroplating, metals used in power plants, and powder metallurgy. He has published papers in all these fields, most of them appearing in A.F.S. TRANSACTIONS, and holds two patents.

Prof. Schneidewind is particularly active in A.F.S.—in addition to being a member of ASM and ASTM—serving in the Educational Division as chairman of the College Research Projects Committee, and as a member of the Executive and the Textbook Committees. He is also a member of the Malleable Division Research Committee and the Essay Contest Committee.

Clyde Frear

Senior materials engineer for the Bureau of Ships, Mr. Frear is a graduate of Syracuse University and of Queen's University (Ontario). He has taught at Lehigh University and the U. S. Naval Academy and has been chief metallurgist for the DeLaval Separator Co., Poughkeepsie, N. Y., and metallurgical engineer for Kelsey-Hayes Wheel Co., Detroit. A frequent contributor to the technical press he has had papers on castings and non-destructive inspection in A.F.S. TRANSACTIONS and AMERICAN FOUNDRYMAN.

Ralph L. Lee

Ralph L. Lee is a member of the employee cooperation staff, General Motors Corp., Detroit, with which he has been associated for 25 years. A frequent contributor to AMERICAN FOUNDRYMAN, he has appeared at many A.F.S. chapter meetings, regional foundry conferences, and conventions as a speaker on practical psychology of human relations and education. He began his industrial career with Delco Light Co., Dayton, Ohio, which later became the Frigidaire and Delco Products Div. of General Motors Corp. He became assistant sales manager for Frigidaire before transferring to Detroit as assistant director of consumer research, later joining the staff of vice-president in charge of sales before assuming his present position.

Edwin W. Horlebein

National President Horlebein is president of Gibson & Kirk Co., Baltimore, Md. Instrumental in forming the Chesapeake Chapter, he was its first chairman in 1940. His long activity in A.F.S. includes membership on the Executive Committee of the Brass and Bronze Division. He was elected a National Director in 1945, Vice-President in 1948, and President in 1949.

Nominations for recipients of A.F.S. Gold Medals may be made by members of past or present Boards of Awards, any elected Society officer, the Board of Directors, the Executive Committee of any of the technical divisions or general interest committees, or by any member of A.F.S., except apprentice or student members.

Members of the Board of Awards are the last seven living Past Presidents of A.F.S. The guiding principle of the Board, in searching for those men deserving of individual recognition by reason of their accomplishments in the field of cast metals, is to honor these men so as to encourage and inspire them to greater achievement within the fundamental objectives of the Society.

Practice of awarding the Gold Medals started in 1924 following endowments in 1920 which made possible four of the five A.F.S. Gold Medals. The endowments were presented by: Joseph S. Seaman, A.F.S. President in 1900; John A. Penton first secretary of the society; John H. Whiting, president of Whiting Corp.; and Wm. H. McFadden, A.F.S. President in 1907. The medals bear the names of the donors. The Peter L. Simpson Award was endowed in 1945 by A.F.S. Past National President Herbert S. Simpson in memory of his father, Peter L. Simpson, a distinguished foundryman and inventor of foundry equipment.

Awarding of Honorary Life Memberships in A.F.S. began in 1924 as a means of rewarding faithful and continuous service to the Society, rather than the purely technical, scientific or metallurgical achievements honored by the Gold Medals of the American Foundrymen's Society.

Last Call For Apprentice Contest Entries For This Year's Competition

DEADLINE FOR ENTERING the 27th Annual A.F.S. Apprentice Contest is March 10. All North American Foundries and pattern shops, regardless of whether they are affiliated with the American Foundrymen's Society, are eligible to enter qualified, indentured apprentices and are urged to do so on or before the deadline.

Complete Contest information can be obtained from Jos. E. Foster, technical assistant, American Foundrymen's Society, 222 West Adams St., Chicago 6, Ill. Canadian entrants can apply directly to G. Ewing Tait, Dominion Engineering Works, Ltd., Box 220, Montreal, Que.

Competition is open in five divisions—gray iron molding, steel molding, non-ferrous molding, (light metals and all other non-ferrous alloys), wood patternmaking, and metal patternmaking. The latter, new this year, has attracted a number of entrants who are finishing rough cast aluminum patterns according to blueprint. Rough casting and blueprint are furnished each contestant.

Patterns for molding and blueprints for wood patternmaking are furnished to contestants in these divisions of the Contest.

As in the past a number of chapters are conducting local contests and in some areas the larger plants are holding in-plant contests. Winning entries in local contests will be sent to Cleveland—special shipping instructions will be issued later—for the National Judging schedule to take place April 8.

The three winners in each of the five divisions will be notified shortly thereafter. First place winner in each division will receive round trip rail and Pullman fare to the 1950 Convention to be held in Cleveland, May 8-12, where he will be presented with $100 and a certificate of recognition by National President E. W. Horlebein. Presentation will be made at the Annual Business Meeting, Wednesday, May 10.

Second and third place winners receive $50 and $25, respectively, and recognition certificates, generally presented at plant or chapter ceremonies.

EXHIBITS Preview

American Foundryman herewith presents a preview of some of the foundry equipment, materials, and services to be exhibited at the 54th Annual Foundry Congress of the American Foundrymen's Society. Detailed information and a view of these and other products of the exhibitors can be obtained during the A.F.S. Show in the Cleveland Municipal Auditorium, May 8-12. Those unable to attend can request information on the coupon on Page 34. Larger second and third sections of Exhibits Preview will appear in the March and the April issues of the Official A.F.S. Convention Publication.

1. Package Sand Conditioner-Mixer

Beardsley & Piper Div., Pettibone Mulliken Corp., will exhibit new, low-cost packaged sand conditioner-mixer units. Built in six sizes, units range in capacity from 8 to 40 tons per hour. Screens, magnetically separates, mulls and aerates sand. May be loaded by front-end loader, overhead cranes or other means. Smaller units may be loaded by wheelbarrow. Eliminates separate facing sands and produces all-purpose sand for molding.

2. Liquid Core Binder

"Esso" Emerald Core Binder will be featured at S. Obermayer Co.'s booth at the 1950 Foundry Congress & Show. A liquid core binder adaptable for all types of foundries, Esso works equally well for small or large cores. Features of coremaking with Esso are: uniform hardness throughout cross section, smooth surfaces with sharp edges, low gas evolution, improved collapsibility and green strength, higher moisture tolerance, less baking time.

EXHIBITS Preview

3. Asbestos Safety Gloves

Safety Clothing & Equipment Co. will feature a complete line of Gardwell Asbestos Gloves. Made from underwriters' grade asbestos cloth, Gardwell gloves are furnished lined or unlined. Available for special jobs reinforced by heat-resistant leather, with special thumb protection.

4. Tilting Arbor Saw

Rockwell Mfg. Co.'s new Delta-Milwaukee 12-in. Tilting Arbor Saw, to be shown at the 1950 Foundry Congress & Show will cut a 4-ft panel into two 24 in. parallel sections, will rip and cross cut 4⅛ in. thick wood, make a 2-in.-wide dado cut or a 2⅞ in. thick cut at a 45 degree tilt. Features are rigid swinging trunnions, removable arbor extension, sawdust deflector, Auto-Set miter gage, rip fence with micro set pinion, special blade guard and scale magnifier lens.

5. Steel Foundry Flask

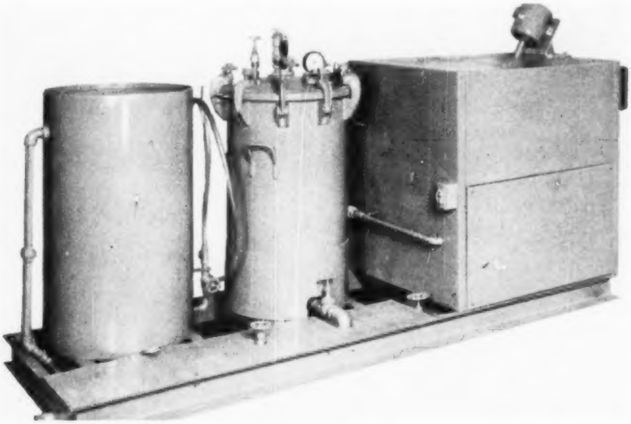
Highlight of the Sterling Wheelbarrow Co.'s booth at the 54th A.F.S. Foundry Congress & Show will be this 24x70x15x13 special steel flask. Weighing 1035 lb, this flask is reinforced with strips on cope and drag to withstand hard usage over a long period of time and is claimed to outlast conventional cast iron flasks.

6. Permanent Mold Casting Machine

Centrifugal Casting Machine Co.'s exhibit at the 54th A.F.S. Foundry Congress & Show, Cleveland, will introduce a permanent mold machine for the production of ferrous and non-ferrous castings. The rollover feature of the Model F machine can be used in the production of either dry sand or green sand cores. Machine is pneumatically operated and can accommodate molds up to 22 in. wide and 26 in. deep. Centrifugal Casting Machine Co. can supply permanent molds as well as the machine.

7. Impregnating Machine

Metallizing Co. of America's exhibit will feature a vacuum pressure impregnating machine for impregnating leaking ferrous and non-ferrous pressure castings against air, water, gas and oil. Manufacturer claims machine will impregnate up to 1,000 lb of castings per hour at a material cost of approximately $1.50.

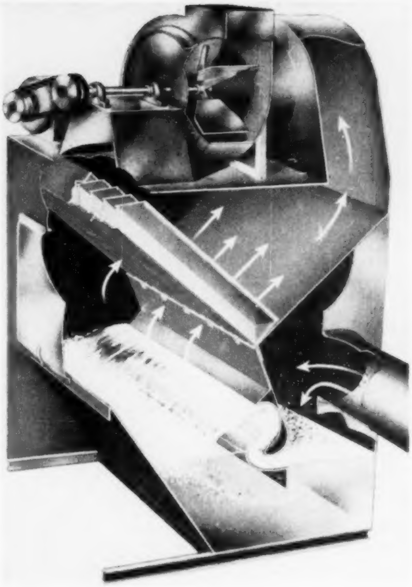


8. Foundry Alloys

Niagara Falls Smelting & Refining Div., Continental Copper & Steel Industries, Inc., will have on display at the 1950 A.F.S. Foundry Congress & Show samples of special foundry alloys and complete literature outlining their application to obtain definite properties. Shown will be the company's line of ferrous and non-ferrous alloys, ingots and antipiping compounds.

9. Hydro-Static Precipitator

Type N Roto-Clone Hydro-Static Precipitator, to be featured at the American Air Filter Co.'s exhibit, obtains its cleaning action with an inverted S-shape water curtain. This wet-type cleaner is available in three designs—(1) flat bottom for manual removal of material, (2) hopper bottom with drag type sludge ejector, and (3) hopper bottom for sluicing of material to disposal point. Advantages: high dust separating efficiency, recirculation of water without pumps or nozzles, collection over wide range of exhaust volumes.

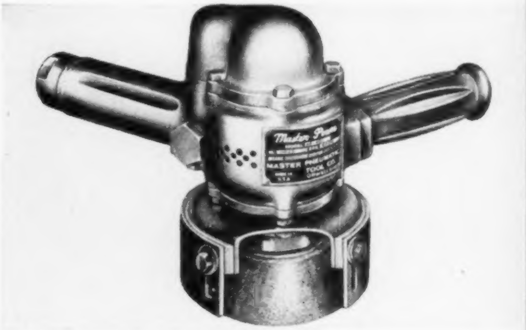


10. Non-Destructive Testing Equipment

Type KDN Magnaflux unit shown here will be displayed at Magnaflux Corp.'s exhibit. Equipped with black light hood and Magnaglo, this portable wet-type unit is designed for sensitive magnetic particle tests on small-to-medium sized castings. Bright fluorescent line reveals each crack and similar defect. Other units to be shown are KRH, a dry powder unit for inspection of large castings; the ZA-12A for inspection of non-magnetic castings; and Sonizon, an ultrasonic instrument that measures metal thickness by contacting one surface only.

11. Lightweight Vertical Grinder

Master Pneumatic Tool Co. will show Model M-401, a lightweight vertical grinder suitable for use with both straight or flared cup wheels. Large oil reservoir provides constant lubrication. Cast-in muffler reduces noise.



Exhibits Preview, AMERICAN FOUNDRYMAN, *222 West Adams St., Chicago 6, Ill.*

Please send manufacturers' literature on the Exhibits Preview items, indicated by circled numbers below, without cost or obligation to me.

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NAME ____________ POSITION ____________

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UNIVERSITY OF ALABAMA'S NEW FOUNDRY OFFERS TOP FACILITIES

Malley J. Byrd
Graduate Student
Department of Journalism
University of Alabama
University, Ala.

SOMETHING NEW HAS BEEN ADDED to the facilities of the University of Alabama's department of metallurgical engineering, whose students are now able to do casting, molding, heat treating and other foundry operations in the University's own foundry.

Student engineers, who formerly had to leave the campus and visit commercial foundries to even witness such operations, are now themselves able to perform the many phases of foundry work in their own foundry, thanks to efforts of the University of Alabama faculty, the Foundry Educational Foundation, and progressive Southern foundrymen.

Foundry Costs $70,000

Costing $70,000, the University's new foundry was financed largely by donations from Southern foundry operators and industrialists interested in furthering foundry education in the Southeastern United States. They contributed $50,000 of the total.

The process of establishing the foundry began last spring, when FEF officials secured the University's approval for the project. Before work could begin, funds had to be raised. To accomplish this, representatives of the Foundry Educational Foundation began contacting Southern foundrymen and industrialists, organizing them into committees to solicit donations of money and equipment. Response to requests for donations were promptly forthcoming and many companies contributed sums larger than those requested of them.

Another committee went to work to procure necessary raw materials, and by the time the foundry was completed in September of last year, a three-year supply of raw materials was assured the school.

The establishment of its own foundry facilities places the University of Alabama among the nation's leaders in the field of foundry education, since only six U. S. universities are similarly equipped.

Three prominent Alabama foundrymen—Dr. James T. Mackenzie, past chairman of the A.F.S. Birmingham District Chapter; F. H. Coupland and J. A. Bowers, all executives of the American Cast Iron Pipe Co., Birmingham, on examining the University's new foundry declared it to be the most complete college foundry in the United States.

Alabama Is Seventh FEF School

Last year the University of Alabama became the seventh U. S. school to have its foundry curriculum sponsored by the Foundry Educational Foundation. Serving the foundry industry in the Southeast, the University is ultimately expected to place 112 graduates per year in Southeastern foundries, 56 of them going into Alabama foundries, and the balance into foundries in six other states. These figures are based on FEF's belief that the industry will absorb one engineering graduate for each 250 men. There are more than 14,000 foundry employees in Alabama and about 32,000 in the Southeast.

University Establishes 10 Scholarships

The University of Alabama has set aside funds to provide 10 scholarships each year to encourage students interested in the study of metals. Headed by Dr. E. C. Wright, head of the department of metallurgical engineering, University officials believe that the University, its student engineers and the foundry industry itself stand to profit by the cooperative effort that has established a high standard of foundry education on the Alabama campus.

Foundry education in the South is looking up!

(Below, left) Alabama metallurgical engineering student examines school's new coreblower. (Second left) Graduate Student John McClanahan checks a sand sample for use in coremaking. (Third left) Alabama metallurgical engineering students inspect new shakeout mixer and sand reclamation unit. (Right) Prof. E. C. Wright, head of Alabama's department of metallurgical engineering, checks foundry's shotblast unit.




SHEET METAL FORMS SIMPLIFY MOLDING AND COREMAKING

Harry W. Dietert
President
Harry W. Dietert Co.
Detroit

This article is excerpted from the new revised edition of *Foundry Core Practice* by Harry W. Dietert, Harry W. Dietert Co., Detroit, published this month by the American Foundrymen's Society. Containing 548 pages, the new edition has more than 300 illustrations and covers all phases of core production, use, equipment, sand, binders, etc., as well as an extensive bibliography of works on core practice.

USE OF TIN FORMS, in reality tinned, sheet-metal forms, in molding and core making operations, has been common in stove and furnace work since about 1880. Both designers and manufacturers of castings for other purposes have not taken, in the past, the fullest advantage of the possibilities offered by such forms for simplifying molding and core room operations and reducing machine work. Recently greater interest has been evidenced in these so-called tin forms.

Tin forms were developed for casting the holes for hinge pins in stove doors and door frames. They were so successful that their use has extended to other types of castings where it is required to produce holes crossways through sections above or below the parting line. The holes thus produced are smooth and of full size and accurately located.

A typical hinge tube for forming a round hole is shown at *A* in Fig. 1. It consists of two parts, a hood, *B*, and a tube, *C*, assembled and held together by heading or swaging out the ends of the tube. The tube is filled with a core sand mixture and dried, similarly to a regular foundry core.

The pattern is provided with a notch to locate the hinge tube in the required position, as shown in *D*, Fig. 1. This notch is of such shape and direction that the hinge tube fits freely in it and the pattern can be drawn away readily, leaving the hinge tube undisturbed in the mold. When the molten metal fills the mold, the hinge tube becomes virtually a part of the casting. The sheet metal of the hinge tube, being protected by the sand on one side, does not melt, but welds to the casting, so that it forms a permanent union. The sand filling shakes out readily.

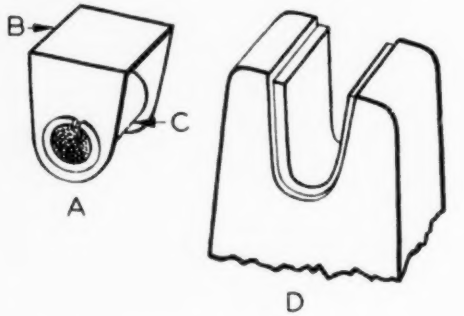


Fig. 1. Method of locating hinge tube in pattern.

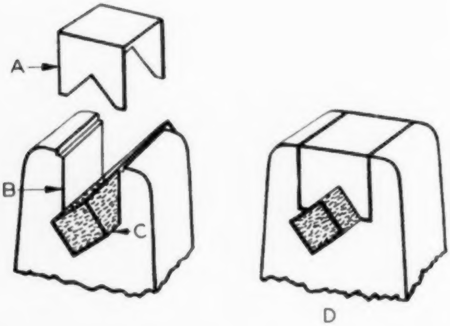


Fig. 2. Typical half hood and method of using it.

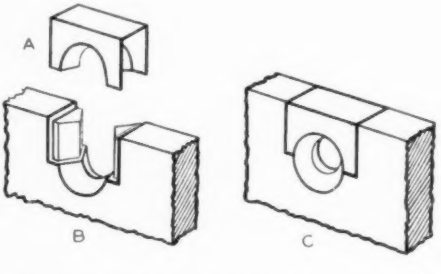


Fig. 3. Tin form for producing transverse holes through relatively thin ribs.

Hinge tubes are made for both round and oval holes in a large number of sizes. A great many of the sizes are denoted by numbers which have been adopted in common by all the manufacturers.

It is desirable to plan patterns so that regular stock hinge tubes can be used. Makers are glad to supply samples and all necessary information in regard to what they can furnish. Most hinge tubes are produced in automatic machines and the cost of tools for a special size is only justified when the quantity required is large.

A modification of the hinge tube, known as a half hood, is sometimes used when a suitable hinge tube is not available. Such a tin is shown at *A* in Fig. 2 for use with a square core. The pattern is cut out as indicated at *B* and the core, *C*, is laid in place and covered by the tin, *A*, as shown at *D*. The mold is then rammed as in usual practice. A little tucking probably will be

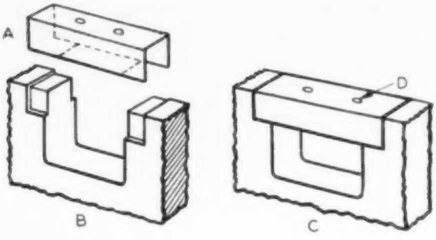


Fig. 4. Typical square slot tin form. Used similarly to tin form shown in Fig. 3.

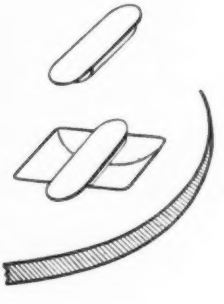


Fig. 5. Lifter bar tins for use in making stove cover castings.

necessary under the protruding ends of the core. When the mold is rolled over and the pattern is drawn, the core is left anchored in the sand at both ends with the half hood below it, its purpose of keeping the sand out of the opening in the pattern having been accomplished. This type of tin can be used for any shape of core, round, square or oval, or for a pin or bar which it is desired to anchor in the casting. These tins have to be made up specially for each job, but if the number of castings required is sufficient to warrant their use, they are said to cost less than the process of making and setting stop-off cores.

Another type of tin used for producing transverse holes through relatively thin ribs is shown in Fig. 3, where *A* is the tin, *B* the pattern recessed to receive it, and *C* the finished casting. The pattern here forms one side of the hole and the tin the other. These tins are not made in stock sizes. They have been developed for certain production jobs where the cost of the necessary tools for producing them has proved profitable.

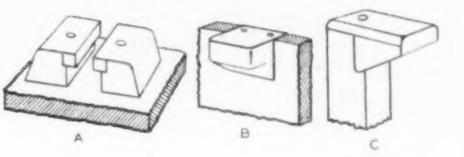


Fig. 7. Tin form shapes: (A) T-slot; (B) bolt hole lug; (C) Turned-in end on malleable conveyor chain.

A tin quite similar in its manner of use to that shown in Fig. 3 is the square slot tin, shown in Fig. 4, where *A* is the tin, *B* the pattern, and *C* the finished casting. As the name implies, these tins are used to cast square holes or slots when it is desirable to avoid the use of cores. The tin is placed in the pattern and rammed up in the usual way, the molder giving the sand a pinch with his fingers to be sure that it fills the slot tightly. The metal enters the tin from both ends and fills it solidly. It is sometimes found advisable to provide small holes in the tins, *D* Fig. 4, to allow gas to escape. Except for a few stock sizes, these are special tins, made up as required when the quantity of castings justifies their use.

To cast the lifter bar in stove covers, tins resembling square slot tins, in their manner of use, have been developed. These are shown in Fig. 5. They are simply dropped into recesses in the pattern to assure their proper location and rammed up in the mold. They form a tunnel which fills up with the molten metal.

So-called tin forms are used in the quantity production of castings having lugs, bosses, feet, or other projecting parts which would interfere with the drawing of the pattern, without the use of cores or draw backs.

All Tins Formed On Same Principle

The general principle of all these tins is the same. The required shape is formed out of thin tin-plate by dies and is arranged so that it can be attached in its proper place on the pattern in such a way that it will not be moved or shifted during the ramming of the sand and that the pattern may be drawn away from it, leaving it in the mold to be filled with the molten metal. The thin metal remains on the casting, the adhesion being sufficient for all practical purposes.

Many of these tin forms are standard and have been given identifying numbers by the makers. A few of the most common applications of these tins are shown

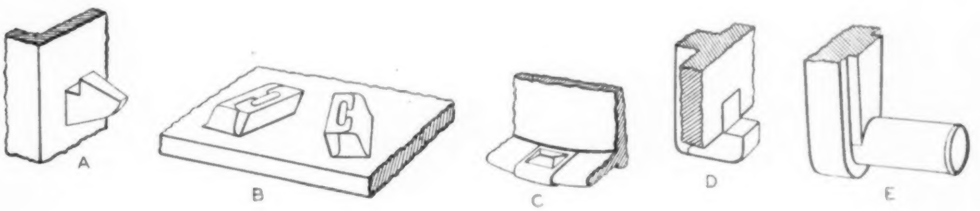


Fig. 6. Common applications that have been given identifying numbers by makers are: (A) Stove door catch; (B) Dovetail lugs; (C) Lug for pump cover; (D) Foot shaped project; (E) Grate bar shaker lug.

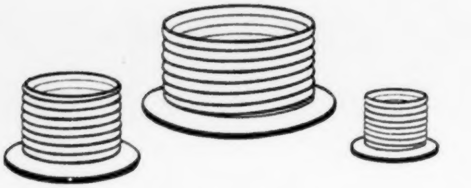


Fig. 8. Forms for producing threaded holes in castings are made in standard pipe thread sizes, U. S. Standard thread, and for stove damper screw sizes.

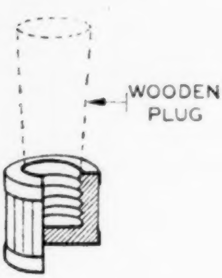


Fig. 9. Tapered wooden plug used to hold insert in position.

in Fig. 6, where *A* is a stove door catch, *B* a pair of dove tail lugs, *C* a lug on the cover of a pump for attaching it to the pump body, *D* a foot shaped projection and *E* the shaker lug on a grate bar. These are all made in several sizes.

Tins for special shapes have to be designed so that they can be economically produced in dies, but if the quantity warrants their use, they are worth while. Some special tins are shown in Fig. 7, in which *A* is a T-slot tin, *B* a lug for a bolt hole in a deep casting, and *C* is a turned-in end on a malleable conveyor chain link.

Threaded holes, with threads sufficiently accurate for many purposes, are formed in castings by means of the tin shells shown in Fig. 8. These shells are dropped in the pattern and filled with green sand in some cases, and in others, they are filled with core sand. One of the places where they are used is in hard iron castings to form the threaded holes to receive grease fittings. The shells are drawn from a flat blank and the threads are produced by rolling. Standard sizes of these shells are made for pipe threads, for some U. S. Standard threads, and for a damper screw considerably used in the stove industry.

Threaded inserts, made and threaded on a screw machine as shown in Fig. 9, also are used for forming screw threads in castings. A patent has been issued on a tapered wooden plug which screws into the insert and forms a shank which is gripped by the sand of the mold to hold the insert in place when the pattern is rapped or vibrated and drawn.

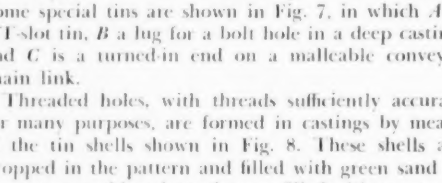


Fig. 10. Forms for making bearing anchor holes.

Tins for Bearing Anchors

A recess in a casting may sometimes be advantageously cored out by means of a tin form. Undercut holes to anchor babbitt metal in place where it is used to form bearings, is a typical example. It is customary to form recesses of this kind by means of small cores secured to the mold or core by means of nails or tacks. Tins the shape of the required anchor hole, Fig. 10, filled with core sand and made with projecting prongs to attach them to the mold, are convenient and economical and can be kept in stock without deterioration or danger of breakage. The sand mixture in these tins, being protected from direct contact with the hot metal, does not vitrify and burn hard, but cleans out readily.

Tins can be used to form a hole or recess in a casting with sharper corners, smoother surface and greater accuracy than can be obtained directly from the sand. Fig. 11 shows at *A* a tin formed with sharp square corners which drops into a recess in the pattern to form a seat in the casting for an accurately fitting bolt head. *B* shows a tin used to secure a square accurate hole in a valve handle, and at *C* a tin shell used to produce a smooth round hole of accurate size.

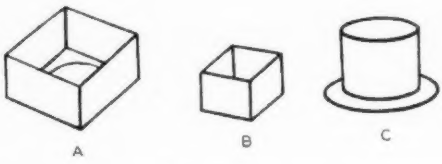


Fig. 11. Forms used to produce holes and recesses.

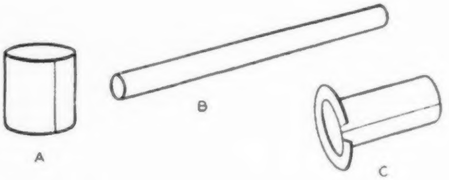


Fig. 12. Tubes for forming various types of holes.

Short tin tubes, as shown at *A* in Fig. 12, are used in molding thin castings, such as lawn mower side frames, to produce smooth, round holes for the connecting bolts. Longer tubes, shown at *B*, are used, filled with core sand, for coring long holes of relatively small diameter where an unprotected core would not withstand the heat. Perforated tin tubes are used sometimes for reinforcing and venting cores and tubes with a flange on one or both ends, shown at *C*, are used for various purposes.

METALLOGRAPHIC AND PHYSICAL TESTING EQUIPMENT FOR FOUNDRY LABORATORIES

In recognition of the trend toward more rigid specifications for foundry products, the A.F.S. Cupola Research Committee has compiled lists of the equipment and supplies necessary to establish laboratories for closer control of the foundry processes. This article is the ninth in a series prepared by the Committee for publication in the *American Foundryman*.

Specifications for castings are usually stated in terms of chemical composition, physical properties, and microstructure, one or more of the groups being designated. The equipment and chemicals required for establishing a foundry chemical laboratory were listed in the article "Basic Equipment for Foundry Chemical Laboratories" published in the January, 1950, issue of AMERICAN FOUNDRYMAN. In the present article the equipment needed for foundry metallographic and physical testing laboratories will be considered.

Physical testing in the foundry usually consists of the following: tensile testing, transverse testing, and hardness testing. Each will be considered separately.

Hardness Testing: Since several correlations have been set up for hardness and tensile properties many foundrymen use the Brinell hardness measurement as a criterion in determining whether their castings meet requirements. Recently, with increased interest in wear resistance, microhardness measurements have been made in the study of the effect of microstructure on this property. Specific equipment for microhardness measurements is available and attachments can be purchased for the bench-type metallographs.

Tensile Testing: Many types of tensile testing machines are available for application to foundry use. A machine capable of testing to 60,000 psi will cover the range of work in most foundries. A tensile testing machine purchased for foundry use should have either transverse testing attachments or means provided so that they may be added later. Several machines are arranged so that they can also be used for Brinell hardness testing of castings. Usually these models are specifically designed for foundry use.

All machines employ hydraulic cylinders, thus requiring grit-free laboratories. It is best to place these machines on the ground floor, but they can be placed over structural beams on upper floors. A lathe is necessary for the preparation of bars for tensile testing.

Dimensional Inspection: Each physical testing laboratory should be provided with means of checking casting dimensions. This requires a surface plate and several gages. The type purchased will depend upon the kind of work handled by the foundry.

Metallographic Examination: Structure control usually dictates the necessity of setting up a regular polishing procedure and a means of keeping a record of the structures for future reference. This calls for an arrangement which provides a specimen preparation room, a polishing room, a semi-darkroom in which the photomicrographic work can be done, and a darkroom for the photographic work. Good polishing can be accomplished only in a clean and well-kept laboratory.

It is usually the practice to store for reference purposes all polished specimens and photographic plates.

Metallographic Laboratory—Specimens to Be Polished and Photographed

Metallograph equipped for bright field work without objectives, eye pieces or illuminating unit, 115 V, 60 cycle, A.C.	1
Ribbon filament lamp with transformer for 115 V, 60 cycle, A.C.	1
Objective, achromatic coated, 5.75X, 32mm, 0.12 N.A.	1
Objective, achromatic-coated, 8X, 24.3mm, 0.20 N.A.	1
Objective, achromatic-coated, 37X, 6mm, 0.65 N.A.	1
Eyepiece, hyperplane-coated, 7.5X	1
Eyepiece, hyperplane coated, 12.5X	1
Plate holder—Double—for 5x7 in. plates with adapters for 4x5 in. and 3¼x4¼ in. plates	2
Lamps, bulb, 6 volt, 108 watt ribbon filament	2
Metal band saw, 14 in. opening, steel base	1
Motor, ½ hp	1
Bench grinder, 2-wheel, one coarse and one fine wheel	1
Emery paper disc grinder with 1/3 hp motor	1
Specimen polisher	1
Bronze polishing discs and clamps	2
Vibrating tool specimen marker	1
Etching dishes	3
Bottles for etchants, 250 cc	3
Nichrome tongs, pair	1
Canvas polishing cloths, doz	1
Selvyt polishing cloths, doz	1
Levigated alumina, lb	1
Emery powder, No. 600, lb	2
Diamond dust, lb	¼
Pure grain ethyl alcohol, gal	2
Picric acid, lb	1
Bottle C.P. nitric acid	1
Table with rubber pad for metallograph	1
Table for polisher	1
Soapstone sink with lead trap	1
Air line with moisture trap and pressure gage	1

Photographic Laboratory for Metallographic Work

Large flat sink with two drainboards	1
Utility table (large enough to take printing box, cutting board, and have room for paper, etc.)	1
Printing box	1
Trays, 12x14 in.	3
Drying racks	2
Cutting board	1
Safe lights	2
Ferrotypes, 18x24 in.	2
Developer for plates, gal cans, doz	1
Developer for paper, gal cans, doz	1
Acid fixing powder, gal cans, doz	1
Plates (Wratten), 3¼x4¼ in., doz	3
Paper (velox No. 3) 8x10 in., gross	1
Paper (velox No. 2) 8x10 in., gross	1

Physical Testing

Tensile testing machine with Brinell hardness indentor and transverse testing attachment, 60,000 psi	1
Bench lathe	1

It is best to catalog specimens and plates in a bound book with numbered pages in which columns are provided for the description of the casting, hardness, difficulties encountered, etc. The filing of specimens and plates is usually done according to this catalog.

Specimen Preparation Room: Most specimen preparation rooms are equipped with a bench and vise, a metal-cutting saw, preferably a band saw, a two-wheel bench grinder with a coarse and fine wheel, and an emery-paper disc grinder for the initial polishing of the specimens. If this room is adjacent to the finish polishing room a tight door is provided between the two rooms to prevent the dust and grit from entering the latter and contaminating the finish polishing wheels. If it is desirable to mount all specimens in bakelite or other plastic, a mounting press is required together with mounting molds and a source of cooling water. In using some types of automatic polishing equipment this is a requirement.

Finish Polishing Room: In this room the finish polishing and etching are done. It is generally equipped with a polishing machine, a utility table, a laboratory sink with a lead trap, and a storage cabinet for supplies. In many cases specimens are stored in this room.

Room for Metallograph: Routine metallographic work is generally accomplished at 100 and 500 magnification; hence, only the lenses required for these magnifications need be purchased. Specimens can be photographed on 5 x 7, 4 x 5, or 3¼ x 4¼-in. plates. Generally speaking, the 4 x 5-in. setup is the most economical since photographic paper comes in multiples of 4 x 5 in. The metallograph should be mounted on springs or rubber pads as vibration does not permit good photography. If macro-work is being done, a macro-camera should be provided.

Darkroom: A bench with a large flat sink in the middle of the top and a drainboard on each side and with storage facilities for pans, chemicals, etc., is ideal. In addition, the facilities should include a printing box, safe lights, trays, ferrotypes, and cutting board. All photomicrographs should be printed on glossy paper.

The equipment shown on the list accompanying this paper will suffice for the routine physical testing and metallographic examination work in the foundry. It can also be used in research programs undertaken to improve foundry methods and techniques.

A.F.S. Southern California Chapter Co-Sponsors Course In Metallurgy

CO-SPONSORSHIP of a course in *"Practical Metallurgy of Engineering Metals and Alloys"* at the East Los Angeles Junior College is being undertaken by the A.F.S. Southern California Chapter, in conjunction with local chapters of the American Society for Metals and the American Welding Society.

The course, held Monday evenings, January 30 to June 12, applies fundamental principles and modern techniques to actual problems of the foundry and metal fabricating industries, and is a semi-professional course applicable to junior college graduation and some credits acceptable to a university.

This practical shop course in metallurgy includes consideration of the basic metallurgy of iron, steel and non-ferrous alloys, including effects of heat treatment on these metals.

Canton District Chapter Honors Its Past Chairmen

Five past chairmen of the A.F.S. Canton District Chapter were awarded certificates in recognition of their services to the Chapter at its "Past Chairmen's Night" Dinner, held January 5 at the Moose Club, Massillon, Ohio. Shown in photograph at left, those honored were, left to right: Edward H. Taylor, F. E. Myers & Bros. Co., Ashland (1948-49); Charles F. Bunting, Pitcairn Co., Barberton (1947-48); I. M. Emery, Massillon Steel Castings Co., Massillon (1945-46); H. Gordon Robertson, American Steel Founders, Alliance (1946-47); and K. F. Schmidt, United Engineering & Foundry Co., Canton (1943-45). At extreme right in photograph is present Chapter Chairman George M. Biggert, United Engineering & Foundry Co., Canton. Present at the meeting were A.F.S. National Vice-President Walton L. Woody; A.F.S. National Director V. J. Sedlon; and A.F.S. National Secretary-Treasurer Wm. W. Maloney. Speaker was Edward H. McFaul of Chicago.

OHIO REGIONAL FOUNDRY CONFERENCE MARCH 10-11

THIRD OHIO REGIONAL FOUNDRY CONFERENCE to be sponsored by the five Ohio chapters of A.F.S. will be held at the Netherland Plaza Hotel, Cincinnati, March 10 and 11. Headed by E. H. King, Hill & Griffith Co., Cincinnati, general conference chairman, representatives of the five chapters—Cincinnati District, Northeastern Ohio, Toledo, Canton District, and Central Ohio—have arranged a program of 19 technical talks, two luncheons, and a banquet. Plant visitations have not been planned because of the unusual quality of the papers being presented.

All events will be held in the hotel at Fifth and Race St. and hotel reservations should be made directly with the Netherland Plaza, mentioning the Ohio Regional Foundry Conference. There is bus service from the railroad station to the hotel, ample parking space in the vicinity, and in the hotel garage.

Advance registration for the conference can be made through Charles Dold, Conference Treasurer, Portsmouth Steel Co., Carew Tower, Cincinnati 2, Ohio. Price of all features of the conference is $12.00; check should accompany advance registration.

Assisting Conference Chairman King with the program are the following co-chairmen: Gray Iron—D. E. Krause, Gray Iron Research Institute, Columbus, and Prof. D. C. Williams, Ohio State University; Steel—George M. Biggert, United Engineering & Foundry Co., Canton; Non-Ferrous—Harry G. Schwab, Bunting Brass & Bronze Co., Toledo; Malleable—S. E. Kelly, Eberhard Mfg. Co., and Fred J. Pfarr, Lake City Malleable Co., Cleveland. Chairman of the host chapter—Cincinnati District—is Walter J. Klayer, Aluminum Industries, Inc.

Friday, March 10

8:30 a.m.—REGISTRATION OPENS.

10:00 a.m.—GENERAL SESSION. *"Industry's Stake in Education,"* Dr. Raymond Walters, president, University of Cincinnati.

"Quality Control," L. G. Mitten, Industrial Engineering Department, Ohio State University.

"Quality Control in Actual Practice," Harry E. Placke, G.H.R. Foundry Div., Dayton Malleable Iron Co., Dayton, Ohio.

12:15 p.m.—LUNCHEON. Speaker to be announced.

2:00 p.m.—SECTIONAL MEETINGS.

Gray Iron—*"The Cupola—Its Raw Materials and Operation,"* B. P. Mulcahy, Fuel Research Laboratory Inc., Indianapolis.

Non-Ferrous—*"The Effect of Melting Practice on Casting Quality,"* George P. Halliwell, H. Kramer & Co., Chicago.

Malleable—*"The Effect of Oxidation in Cupola Melting on the Annealability of Malleable Iron,"* Milton Tilley, National Malleable & Steel Castings Co., Cleveland.

Steel—*"Use of Metallurgical Oxygen at American Steel Foundries,"* L. L. Whitney, American Steel Foundries.

3:30 p.m.—SECTIONAL MEETINGS.

Gray Iron—*"Gating and Risering,"* Harry W. Kessler, Sorbo-Mat Process Engineers, St. Louis.

Non-Ferrous—*"Determination of Melt Quality—Tin Bronzes,"* L. W. Eastwood, Battelle Memorial Institute, Columbus, Ohio.

Malleable—*"Direct Air Furnace Melting,"* Robert O. Mayer, Haven Malleable Castings Co., Cincinnati, and *"Zirconium in Malleable Iron,"* John Varga, Jr., Case Institute of Technology, and Howard Bleil, Lake City Malleable Co., Cleveland.

Steel—*"Melting Practice on Hydrogen,"* Sam F. Carter, Jr., American Cast Iron Pipe Co., Birmingham.

7:00 p.m.—CONFERENCE DINNER. Speaker: E. A. McFaul, Midwest Institute, Chicago.

Saturday, March 11

7:30 a.m.—Ohio State University breakfast for graduates who have entered the foundry industry.

8:30 a.m.—REGISTRATION OPENS.

9:30 a.m.—SECTIONAL MEETINGS.

Gray Iron—*"Quality Castings Require Good Sand Practice,"* Thomas E. Barlow, Eastern Clay Products Inc., Jackson, Ohio.

Non-Ferrous—*"Control of Quality of Aluminum Alloy Castings,"* R. R. Senz, Aluminum Co. of America, Cleveland.

Malleable—*"Pearlitic Malleable Irons,"* Gordon B. Mannweiler, Eastern Malleable Iron Co., Naugatuck, Conn.

Steel—*"The Use of Exothermic Materials as Aids to Better Feeding,"* Michael Bock, Exomet Inc., Conneaut, Ohio.

11:00 a.m.—SECTIONAL MEETINGS.

Gray Iron—*"Control and Tests for Quality Castings in the Smaller Foundry,"* Alexander D. Barczak, Superior Foundry Inc., Cleveland.

Non-Ferrous—*"The Effect of Gating and Risering on Magnesium Casting Quality,"* H. E. Elliot, Dow Chemical Co., Bay City, Mich.

Malleable—*"Consolidating, Estimating, and Costing Through Effective Control,"* Dickey Dyer, Dyer Engineers, Inc., Cleveland.

Steel—*"Re-use and Reclamation of Steel Foundry Sand,"* Clifford Wenninger, Foundry Dept., University of Kentucky.

12:15 p.m.—LUNCHEON. Recognition of national officers and program by Cincinnati Chapter of A.F.S.

Future Meetings and Exhibits

PURDUE UNIVERSITY, materials handling conference, West Lafayette, Ind.—Feb. 20-21.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual committee week, William Penn Hotel, Pittsburgh—Feb. 27-Mar. 3.

OHIO REGIONAL FOUNDRY CONFERENCE, A.F.S. Cincinnati District, Canton District, Northeastern Ohio, Central Ohio and Toledo Chapters, Netherland Plaza Hotel, Cincinnati—Mar. 10-11.

STEEL FOUNDERS' SOCIETY OF AMERICA, annual meeting, Edgewater Beach Hotel, Chicago—Mar. 21-22.

NATIONAL ASSOCIATION OF CORROSION ENGINEERS, annual conference, St. Louis—Apr. 4-7.

CHICAGO TECHNICAL SOCIETIES COUNCIL, national production exposition, Stevens Hotel, Chicago—Apr. 4-8.

AMERICAN SOCIETY OF TOOL ENGINEERS, Philadelphia—Apr. 10-14.

METAL POWDER ASSOCIATION, annual metal powder show, Detroit—April 25-26.

54th Annual Foundry Congress and Exhibit, American Foundrymen's Society, Public Auditorium, Cleveland. May 8-12.

ELECTRIC METAL MAKERS GUILD, annual meeting, Shawnee Hotel, Springfield, Ohio—June 1-3.

AMERICAN ELECTROPLATERS' SOCIETY, fourth international electrodeposition conference, Statler Hotel, Boston—June 12-16.

MALLEABLE FOUNDERS' SOCIETY, annual meeting, The Homestead, Hot Springs, Va.—June 22-23.

AMERICAN SOCIETY FOR TESTING MATERIALS, annual meeting and exhibition, Haddon Hall, Atlantic City, N. J.—June 26-30.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION, annual meeting, The Greenbrier, White Sulphur Springs, West Virginia—Oct. 12-14.

GRAY IRON FOUNDERS' SOCIETY, annual meeting, Netherland Plaza Hotel, Cincinnati—Oct. 19-20.

AMERICAN SOCIETY FOR METALS, national metal exposition and Congress, International Amphitheater, Chicago—Oct. 23-27.

MODERN FOUNDRY METHODS...

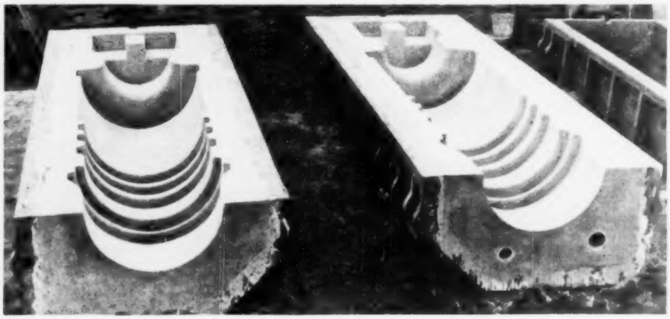
CASTING STEEL AND IRON ROLLS

Heritage of craftsmanship is combined with the latest in modern foundry technology at the Mackintosh-Hemphill Co., Pittsburgh, the first foundry west of the Alleghenies and one of the world's oldest manufacturers of steel mill rolls. Shown on these pages are the various processes for the casting of both steel and iron rolls.

Mold construction for the casting of steel rolls involves use of iron half-rings as chills. About ½ in. of silica sand covers the chills and is shaped to form the finished mold by a sweep contoured to the shape of the roll. The mold surface is then dressed, dried in an oven, and the two half-flasks are clamped together.

The completed mold is stood on end in a pouring pit and the metal

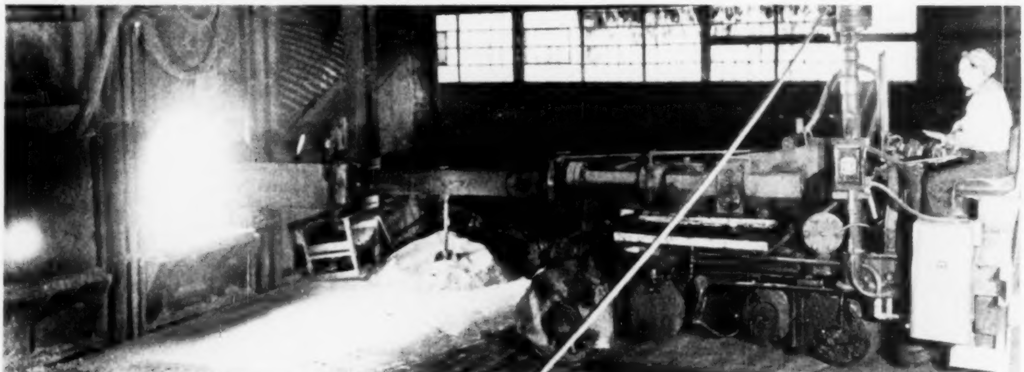
Flask is lowered into pit for vertical pouring of steel roll. On large rolls, sinkhead mold is added when this stage is reached.



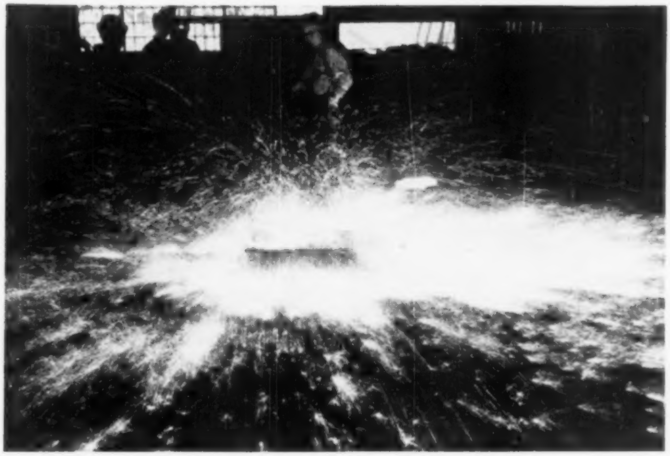
Two halves of blooming mill roll mold. Made with a sweep, the mold contains chills where ridges are seen covered by about one-half inch of sand.

As time for tapping furnace ,approaches, frequent tests are made to determine composition and temperature. Molten metal is taken from the furnace in a steel spoon, slag is skimmed off, and temperature read with optical pyrometer.

Boxes filled with pig iron and scrap are dumped into open hearth furnace by a charging machine. Other alloying metals are added later and the steel is refined in furnace for several hours.



...MODERN FOUNDRY METHODS



Fine samples of steels too hard to be drilled for analytical filings are obtained by splashing a spoonful of molten metal on a clean steel plate. Finest of the splashed particles are powdered with an air hammer for analysis.

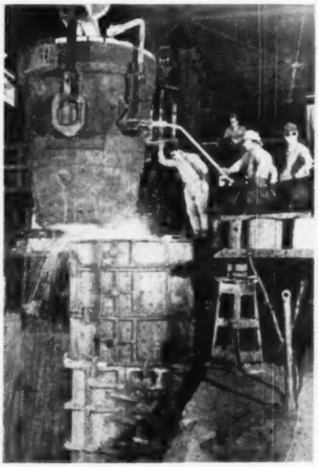
When steel reaches temperature of about 2900 F, furnace is tapped and metal flows into steel ladle. Overhead crane carries ladle to pouring platform in an operation timed to give definite, critical pouring temperature.

poured through gates at the bottom. Mold is nailed to prevent swirling motion of metal from tearing sand loose. Some rolls are so large that the mold for the sinkhead is not added until the flask is in pouring position.

Pig iron and scrap are put into an open hearth furnace by a charging machine and other alloying metals are usually added after the pig and scrap have melted. When the metals have melted, they are refined in the furnace for several hours. As time for tapping approaches, frequent tests are made to determine composition and temperature of the metal. Since some steels used for rolls are too hard to be drilled for test specimens, a spoonful of molten metal is splashed on a clean steel plate. The finest of the splashed particles are then powdered with an air hammer for analysis.

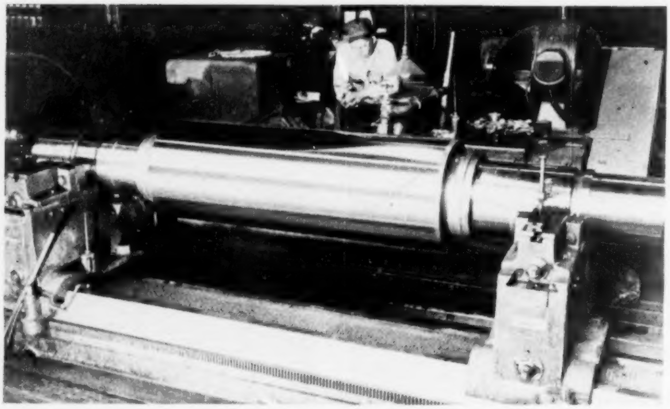
When steel reaches tapping temperature, generally around 2900 F, the furnace is tapped and the metal flows into the ladle. An overhead crane carries the ladle to the pouring platform in an operation that

All steel rolls are bottom poured. Lever lifts plug from bottom of ladle and metal flows down runner into gate at bottom of mold. Any sand and slag collect through centrifugal action and rise into sinkhead at top of mold.

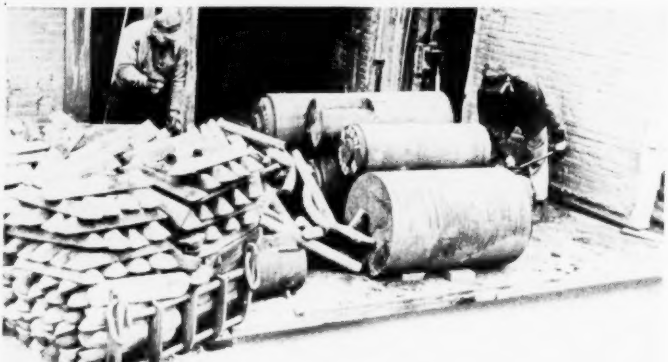


After cooling a week or more, roll is removed from mold, cleaned, and annealed. Roll is then rough machined and normalized.

MODERN FOUNDRY METHODS...



Surface of steel roll is ground until it is as smooth as a mirror in a final operation. Roll will now be carefully crated for shipment.



Loading an air furnace with pig iron and scrap for production of iron rolls. Weight and chemical composition is marked on each piece of scrap and chemical composition of the four component types of pig iron is known before charge is put into air furnace.

is controlled almost to the second.

All rolls are bottom-gated, with the actual pouring done from the top. Metal flows down runner inside the flask proper, entering the mold cavity through a gate at the bottom.

Large rolls take several hours to freeze and often more than a week to cool. Roll is then removed from mold and taken to the chipping floor for cleaning. In an annealing oven the roll is brought to a bright red heat to break up the course structure produced during initial slow cooling. Roll is then rough machined and returned to the oven, where it is again brought to a red heat.

Taken from the oven, necks and wabblers, or couplings are quickly covered for slow cooling, while the surface of the body is air quenched for quick cooling. The roll is then put in a large lathe and the necks, wabblers and body surface machined to exact dimensions. The final operation involves grinding of the surface until it is as smooth as a mirror.

The making of iron rolls is fundamentally the same as for steel, but there are some important differences. Pig iron and scrap are melted in an air furnace. The calculated charge is usually put into the cold furnace through an outside door by the night crew, the furnace lighted at about 7:00 a.m., and the charge is usually melted by noon.

Most iron rolls are chilled to give

A revolving brush is used to clean the inside of each section of a chill mold. Surface is then sprayed with blackening compound to protect mold from molten metal. Necks and wabblers are cast in sand. After blackening, entire mold is baked several hours to remove moisture.

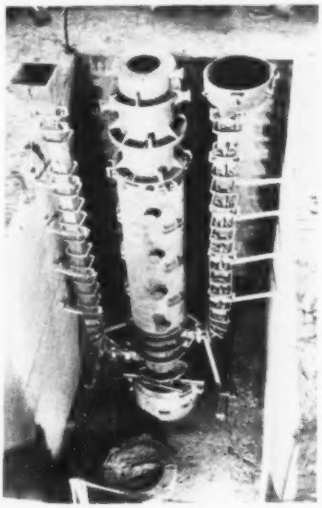
...MODERN FOUNDRY METHODS

hardness to the rolling surfaces. Since a hard surface is wanted only on the body of the roll while softer metal is desired in necks and wabblers, these parts are cast in sand for slower cooling.

A wooden pattern of the size and shape of the necks and wabblers is placed inside that part of the steel flask and sand is rammed around the pattern. Pattern is then removed, the sand surface blackened, and the mold placed in an oven for several hours to bake out all moisture.

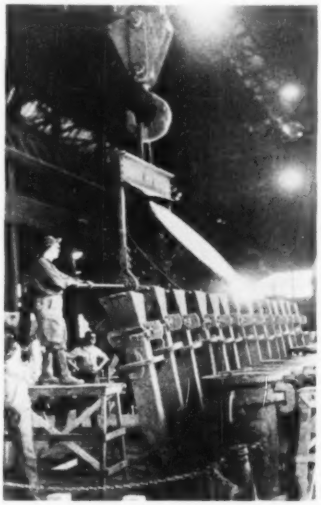
Mold is placed in pit ready for pouring. In contrast to pouring practice for steel rolls, the runners are on the outside of the mold. The furnace is then tapped, the temperature taken with a pyrometer, and the metal poured into two runners at the same time.

Iron rolls are poured from the lip of the ladle rather than through a nozzle at bottom for greater pouring speed. Pouring temperature is 300 F or more lower than steel and rate is almost a ton a second.



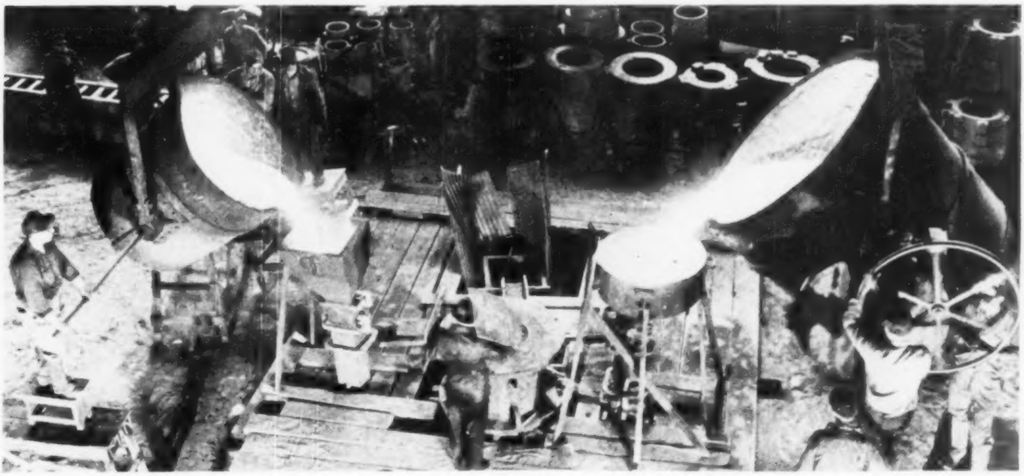
Mold for large iron plate mill roll assembled and placed in pit ready for pouring. Runners are on outside of mold, in contrast to steel roll casting practice.

Melting room foreman takes temperature of molten iron with a pyrometer as furnace is tapped.



Not all rolls produced by Mackintosh-Hemphill are large. Here workmen are pouring a series of small cast iron rolls.

Shown below is metal being poured into two runners simultaneously. Man in center regulates pouring, which is done slowly until ingates are full, then as rapidly as possible because iron freezes fast in relatively cold metal mold.



England's 585-Year-Old

"Worshipful Company Of Founders"

Ancient and colorful is the history of England's "Worshipful Company of Founders," whose 70 members today comprise some of Britain's most prominent foundrymen. Representing today, as it represented at its founding 585 years ago, the interests of the British foundry industry, the Worshipful Company of Foundrymen makes valuable contributions to the industry's progress in the form of technical scholarships and fellowships to engineering schools.

Originally ordained in 1365, the Company was formed to insure that all castings made in the London area were of good metal. The section of London known as Lothbury, according to a contemporary historian, derived the first syllable of its name from the "loathsome noise" produced by the foundries of that vicinity. It is here that Founders' Hall is located. The present Hall was built in 1877 on the site of the first Founders' Hall, built in 1541.

In preserving the general welfare and reputation of the foundry craft, the Company was empowered to accept or reject all who wished to become apprentice foundrymen in the City of London, thus it was ordained in 1497 that "evry Brother taking an apprentice shall present him to the Wardens afore he be bounde, so that they may see and understande that he be free born and hole of lym."

The Worshipful Company of Founders, because it embraced all foundrymen of the City of London and had absolute powers over the apprentice system, soon grew to be a power in the industrial and civic life of early London.

Among rights of the Company was that of fining any member who wished to join another trade guild. The Company also had the power to supervise the morals of its members and to enforce discipline by means of fines or dismissal.

Members of the company participated regularly in maintaining "watch and ward" in the city, and provided armed forces and munitions for services both at home and abroad. The Company was assigned positions at all coronations and civic functions, along with other English trade guilds.

For many years before the Company was able to finance scholarships and fellowships from its funds, it conducted a charitable fund for the relief of distressed foundrymen and their families.

For some 300 years the subject of weights and measures formed the most important of the Company's duties. This was closely allied with the Company's general powers of search and supervision of the foundry craft within the City of London.

The Company employed searchers who protected its high standards of craftsmanship by detecting the presence, for example, of lead in work claimed to be made solely of brass. It was a fundamental principle of the Company that the public should not be deceived by unscrupulous foundrymen. The Company's responsibility for checking weights and measures ceased when the City of London appointed its own searcher more than a hundred years ago. Nevertheless, the Company's rights in this respect have never been abolished.

Although the Company received its "Ordinances" from the City in 1365, it did not obtain its royal charter until 1614, in the reign of James I. Earlier, in 1590, the Worshipful Company of Founders were granted the coat of arms shown at the left.

In common with other city Companies, the Founders were compelled to surrender their charter to the tyrannical James II. They were given it back, however, by William of Orange, James' successor, in a proclamation that is held to be the last confirmation of the rights and privileges of the people of the City of London.

One of the great traditions of the Worshipful Company of Founders concerns a beautiful painted Venetian glass goblet presented by Richard Weoley at the time of his swearing-in as master of the Company in 1640. The cup is unique in that it was brought to England after the sacking of Boulogne, France, by Henry VIII as "parte of the pillage then taken of a Yeoman of the Crowne."

Each year the newly-elected Master of the Company drinks hypocras, a spiced red wine whose formula is carefully handed down from generation to generation, from The Weoley Cup during his formal induction ceremonies. The Weoley Cup is used at no other time. During World War II a dugout was cut into the concrete floor of the strongroom in Founders' Hall to protect the cup from bombings.

Today numbering among its members, or "liverymen," many founders prominent in the Institute of British Foundrymen and the British Cast Iron Research Association, the 585-year-old Worshipful Company of Founders continues to carry out its time-honored precepts—ensuring the quality of work produced by the foundry industry and ensuring the future of that industry by encouraging young men to take up foundry as a career.

Editors' Note: This article is excerpted from the London, England, *City Press*, December 2, 1949.

EVALUATING CASTING FINISHES

H. H. Fairfield, Chief Met.
and
James MacConachie, Sand Supv.
The William Kennedy & Sons Ltd.
Owen Sound, Ont., Canada

Purchasers of industrial products use standard engineering specifications to ensure that they get what they want. Materials are produced to specifications for color, corrosion resistance, heat resistance, impact strength, and many other properties. The use of a standard specification assures the purchaser that the product will be satisfactory.

When machined metal parts are purchased, the type of surface finish can be specified by referring to the established standards. When castings are purchased the buyer has no assurance that the type of finish will be satisfactory. This uncertainty as to casting finish might cause the buyer to turn to other types of metal parts.

It would be advantageous to the foundry industry to be able to supply castings to surface smoothness

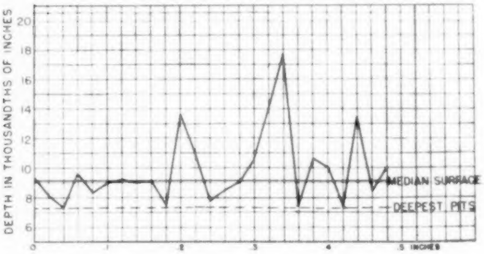


Fig. 1—Graph of 25 profile measurements (Table 1) of a cast surface made with a needle-tipped dial indicator.

standards. The following comments are therefore presented to serve as a starting point for discussions of surface finishes for castings.

Casting Finish Is Important

Although a rough casting may be as useful as a smooth one, it has less appeal to the buyer. For a great many buyers of castings, the appearance of the skin is the deciding factor. Therefore, if a supplier can guarantee a certain grade of finish, he is in a better position to sell his product.

The finish on castings which are buffed and polished will have a considerable effect upon the cost of the casting. Smoother castings will require less work in the polishing room. The amount of paint required to coat an as-cast surface will depend upon the surface roughness. The weight of enamel per square foot will also be affected by surface finish.

Castings which are highly stressed, such as aircraft components, will have fatigue life dependent upon the smoothness of the castings. It has been well proven that rough surfaces will cause early failure in a highly stressed part subjected to alternating stresses.

One method of measuring finish is to weigh a casting, buff it to the desired finish, and weigh again. The loss in weight per square inch of surface is a rough though practical measure of surface finish (H. H. Fairfield and J. MacConachi, "Casting Surface Finish," A.F.S. Transactions, vol. 57 (1949).

A customer interested only in painting castings can weigh a casting, apply paint in successive coats until a suitable finish is obtained, and weigh again. Finish could be expressed as the weight of paint or enamel required per square foot.

Method of Measuring Finish

The foregoing tests would be suitable for certain specialized industries. However, in order to have a test procedure that would be universally acceptable, it is necessary to have a more exact procedure. It would seem logical to use the procedure already developed for machined surfaces. This procedure has been described by G. Hobman, "How to Measure Surface Roughness of Castings," American Foundryman, Oct., 1949, p. 46, and employs a simple direct-reading instrument with which 25 to 50 readings are taken in succession over the casting surface.

Figure 1 shows a typical set of profile readings such as obtained with a needle-tipped dial indicator fixed to and indexed by a shaper head or milling machine

Table 1

Measurement	Measurement²
9.4	88.36
8.1	65.61
7.3	53.29
9.6	92.16
8.3	68.89
9.0	81.00
9.2	84.64
9.0	81.00
9.1	82.81
7.5	56.25
13.7	187.69
10.9	118.81
7.8	60.84
8.5	72.25
9.0	81.00
10.5	110.25
14.0	196.00
17.7	313.29
7.5	56.25
10.6	112.36
10.0	100.00
7.5	56.25
13.5	182.25
8.5	72.25
10.0	100.00
246.2	2573.50

Average surface is $\frac{246.2}{25} = 9.848$

Unit = 0.001 in.
Standard Deviation = R.M.S. = σ

$$\sigma = \sqrt{\frac{2573.50}{25} - \left(\frac{246.2}{25}\right)^2} = 2.43$$

That is, the standard deviation of the hills and valleys from level is 0.00243 in.

Table 2

Measurement	Depth of Valley	Depth of Valley²	Height of Hill
9.4	—	—	0.3
8.1	1.0	1.00	
7.3	1.8	3.24	
9.6	—	—	0.5
8.3	0.8	0.64	
9.0	0.1	0.01	
9.2	—	—	0.1
9.0	0.1	0.01	
9.1 Median	—	—	—
7.5	1.6	2.56	
13.7	—	—	4.6
10.9	—	—	1.8
7.8	1.3	1.67	
8.5	0.6	0.37	
9.0	0.1	0.01	
10.5	—	—	1.4
14.0	—	—	4.9
17.7	—	—	8.6
7.5	1.6	2.56	
10.6	—	—	1.5
10.0	—	—	0.9
7.5	1.6	2.56	
13.5	—	—	4.4
8.5	0.6	0.36	
10.0	—	—	0.9
	11.2	15.03	29.9

$$\sigma = \sqrt{\frac{15.03}{12} - \frac{(11.2)^2}{12}}$$

$$\sigma = 0.62$$

Average height of hill $= \frac{29.9}{12} = 0.0025$ in.

Probable maximum depth of valleys $= 3\sigma = 0.00186$ in.

Table 3

Type of Metal	Normal Roughness Values		
	Smooth	Average	Rough
Aluminum	0.25	0.50	1.00
Brass	0.50	1.00	2.00
Iron	1.00	2.00	4.00
Steel	2.00	4.00	8.00

Roughness reported as standard deviation from surface in 0.001 in. units.

arbor. Readings were made in a straight line at 0.02-in. intervals. Calculating as described by Hobman, the data of Fig. 1 give a roughness value of 2.43 (units are 0.001-in.). The calculations involved are shown in Table 1. For a full explanation of the terms *root mean square* and *standard deviation*, the ASTM *Manual on the Presentation of Data* is recommended.

A more detailed treatment of the data of Fig. 1 is shown in Table 2. The average of the depth measurements is 9.848. The authors believe that the median is a better indication of the true surface. The median of the depth measurements is 9.1, that is, there is an equal number of readings above and below this value.

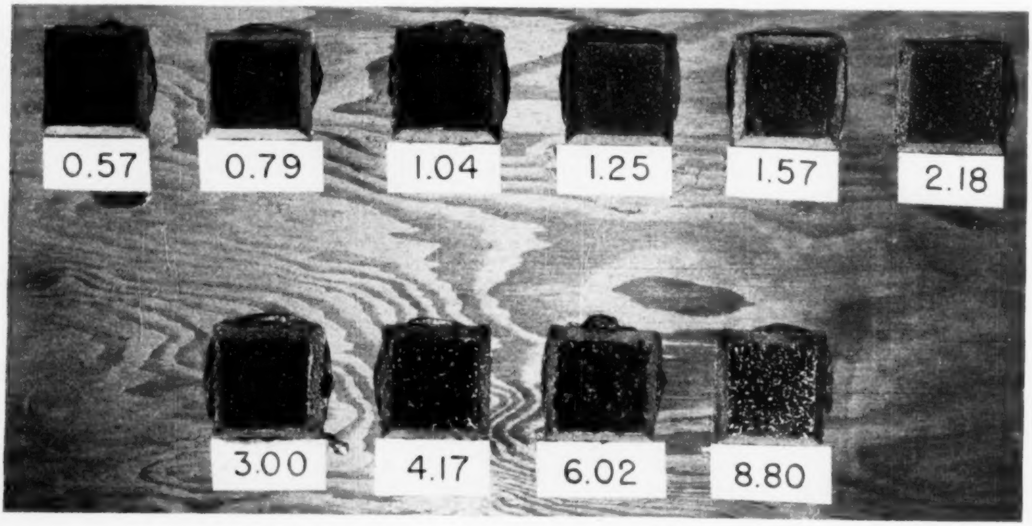
In Table 2 the valleys and hills are considered separately. In smoothing the surface of a casting it is fairly easy to remove the bumps. The depth of the deepest pits, however, is the factor which determines how much work is necessary. The standard deviation of the valley depth is 0.621; therefore, it can be estimated from the mathematics of probability that the greatest depth of pits in the surface will be 3×0.621 or 0.00186 in. deep.

Degree of Smoothness Depends Upon Metal Type

Types of finish offered by the casting producer may range from 0.25 deviation to 10.0 deviation from the surface measured in units of 0.001 in. Table 3 gives a tentative estimate of the type of finish normally obtained on castings of different alloys.

Other branches of the metal working industry have made use of a set of finish standards. Usually visual comparison of the surface in question with the standards will establish the roughness rating. A set of measured surface specimens such as might be used by the foundry industry and designers and purchasers of castings is shown in Fig. 2. These specimens were reproduced by precision casting methods.

Fig. 2—A set of measured cast surface finish specimens which were reproduced by precision casting methods.



COPPER-BASE ALLOYS HAVE WIDE RANGE OF PROPERTIES

R. A. Colton
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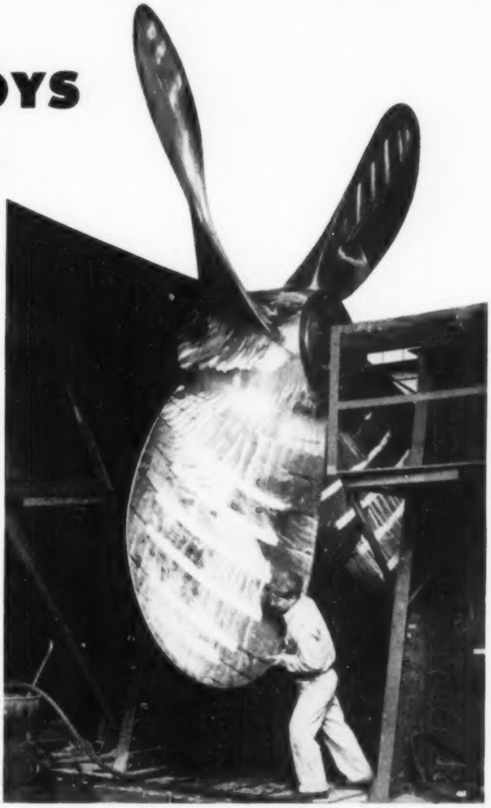


Among the varied applications of low tensile manganese bronzes are propellers for ships and small boats.

Of all the metals cast in foundries the copper-base alloys offer the greatest variety of useful properties of any class of alloys available to industry. Almost unlimited combinations of physical and casting properties are possible, good machinability is the rule, and composition can be modified to produce almost any desired property. Metallurgical knowledge of copper-base foundry alloys is extensive, as it should be, for these are the oldest of all casting alloys.

What does this great flexibility and versatility mean to the foundryman? By competent selection it is possible for the foundryman to make a brass or bronze casting to fill almost every requirement. True, some steels have greater strength or corrosion resistance, some irons are highly castable, some aluminum alloys have excellent machinability; but among the available copper-base alloys it is possible to find more desirable combinations of properties than can be found in any other group of metals or alloys.

Best evidence of the versatility of copper-base alloys is the wide variety of products made from brass or bronze. Machine parts, plumbing fixtures, valve bodies, hardware, decorative ware, ships' propellers, aircraft and automotive parts are common applications.

Select Alloy for Performance

Familiarity with this wide variety of alloys is essential to the foundryman who must be prepared to supply castings in any or all of the metals. Equally important, the engineers or designers who specify or order castings should know all the alloys available for any job. It is a much too common practice for a customer desiring castings to ask for "red brass", "bronze", or "phosphor bronze" and leave the choice of the alloy to the foundryman, who may be unfamiliar with the application and who may select an alloy giving something less than maximum possible performance.

The foundryman should know what he has to sell, and advise engineers wisely. A well-advised customer is likely to be a satisfied customer—one who returns for more brass or bronze castings. With the large number of alloys available, each casting job should be examined carefully to determine which alloy will perform most satisfactorily.

Every non-ferrous foundryman must be prepared to recommend alloys. Closer cooperation between casting designer, buyer, and producer will, in the final analysis, give industry a better casting at a lower price.

What are the copper-base alloys available to industry? The various families of brasses and bronzes may contain, in addition to copper, various amounts of tin, lead, zinc, nickel, silicon, aluminum, manganese, and iron. Formerly alloys of copper and zinc were called brasses, and alloys of copper and tin were called bronzes. Today, with so many compositions requiring more than two elements, there is no exact definition of a brass or a bronze. Even alloys of copper and silicon or copper and aluminum have been called bronzes.

Usually, alloys having more than 10 per cent zinc are called brasses, although this is not a rigid definition. Exact differentiation between what may be called brass or bronze is not so important, however, as is familiarity with the alloys of copper available for foundry use. Consider, then, the groups of alloys described in the following (the classifications are arbitrary and selected only for convenience).

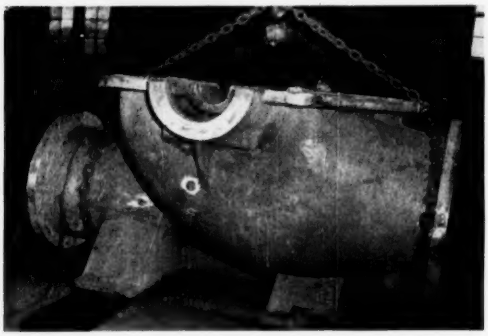
Pure Copper: Comparatively few pure copper castings are used industrially. Where electrical conductivities exceeding 85 per cent are required castings must be made from high grade copper, with some small additions of specific elements permitted to facilitate manufacture. Controlled small amounts of zinc, phosphorus, lithium or calcium boride can be added to pure copper as deoxidizers without seriously impairing conductivity.

Tin, silicon, iron, magnesium, and aluminum all

have highly deleterious effects on electrical conductivity when present even in small amounts. Lead has no metallurgical effect on conductivity since it is out of solution and reduces conductivity only by reducing the effective cross section of the copper. Lead improves the normally poor machinability of copper.

Copper castings are used principally for parts requiring high electrical or thermal conductivities. Some castings are made from copper for use in chemical industries because good corrosion resistance is desired. The uses of copper castings are limited, but in applications where conductivity is more important than strength or machinability copper will perform satisfactorily.

Foundry characteristics of copper are not too good. High temperatures are required for melting and pouring. Gas porosity is a common defect in copper castings but can be eliminated by developing a consistent practice based on understanding of the reasons for its



Bottom of a pump casing weighing 8340 lb was cast in tin bronze by Oregon City Foundry, Oregon City, Ore.

occurrence. Shrinkage is that of a pure metal, with severe primary piping. Normally, large gates and risers must be used to avoid shrinkage defects in the castings.

High-Copper Alloys: When high electrical conductivities must be accompanied by high tensile and yield strengths a class of alloys is available that offers the tensile and yield strengths of steel castings with conductivities of better than 70 per cent. For engineering applications alloys of this class are worthy of attention.

These materials are principally copper with small amounts of chromium, cobalt, silicon, or beryllium added. Most but not all compositions are proprietary alloys. To obtain the excellent properties of these alloys heat treatment is necessary, and careful control of chemical analysis and heat treatment procedures is essential.

Considerable quantities of these materials are used in welding equipment, for electrical contacts or breakers, or in any application where high strength, high conductivity and corrosion resistance are essential.

Foundrywise, these alloys are not good. They are difficult to handle and, while a number of foundries can make satisfactory castings, considerable experience is required in order to exercise the degree of control necessary for working with such materials.

Copper-Zinc Alloys: Alloys of copper and zinc are true brasses. The casting alloys are principally copper with 15 to 40 per cent zinc plus small amounts of lead, tin, aluminum, etc. This group of metals has application in innumerable places where ease of handling, economy, machinability and attractive appearance are important.

Zinc added to copper hardens and strengthens it in the commercial range of alloys containing up to 40 per cent zinc. Of the lower zinc types, one containing 85 per cent copper and 15 per cent zinc (the wrought "red brass") is called "brazing metal" and is used in the electrical industries for its conductivity.

The best known of the brasses are those in the range 60-70 per cent copper with 30-40 per cent zinc. They are called "yellow brasses" because of their pleasing golden-yellow color. These alloys, which machine and polish excellently, usually have small amounts of lead present to improve machinability and tin to improve physical properties. Tensile strengths up to 35,000-40,000 psi are available with good ductility.

The yellow brasses are commonly used for plumbing fixtures which are chrome plated. They can also be soft-soldered with facility and are used in assemblies where ease of machining and joining is essential. Other uses include hardware (doorknobs, window catches, etc.), decorative ware (andirons, door knockers, etc.) and others where a polished surface is needed.

Foundry Ventilation Required

These alloys are fairly easy to handle in the foundry since they do not exhibit gas porosity in castings and are not difficult to gate and riser. Some care is necessary to prevent zinc oxide dross from entering the mold cavity. Since high-zinc alloys may produce considerable fumes and smoke (zinc oxide) if overheated, good ventilation in the shop is desirable.

One of the most common copper-base die-casting alloys is a 60-40 yellow brass. This alloy can also be permanent molded.

Copper-Tin Alloys: These are the true bronzes and may be the oldest of all copper-base alloys. Tin strengthens and hardens copper and the corrosion resistance of some tin bronzes is at least equal to that of copper itself. Tin contents of commercial alloys run from 1 to 22 per cent, with those of about 10 per cent tin most commonly used in engineering applications. Tin contents beyond 11 per cent make the alloy extremely hard and brittle, and only a few alloys with higher tin are used. Piston rings are made from bronzes with 13 to 16 per cent tin, and bells are made from a 20 per cent tin alloy because of fine tonal quality.

The alloy with 89 per cent copper and 11 per cent tin is known as gear bronze. It has excellent wear resistance, good strength and hardness, and resists corrosion from lubricants. This is similar to the alloys called "phosphor bronzes" which are essentially 10-11 per cent tin in copper with up to 1 per cent phosphorus added. This alloy is most widely used in England. True phosphor bronzes are not often used in this country. Here, instead of using phosphorus as a deoxidizer, and hardener, zinc up to 4 per cent is used, giving the 88-10-2 type of alloy or the well-known Navy "G" (88-8-4).

In the same family of alloys are found a number of

Properties and Applications of Some Commonly Used Copper-Base Alloys

Alloy Classification	Commercial Designation	Nominal Composition Cu	Sn	Pb	Zn	Fe	Typical Properties T.S., psi	Y.P., psi	El., %	Machinability	General Remarks	Typical Uses
Tin Bronze	Navy "G"	88	8	—	4	—	45000	23000	30	Fair	Excellent salt water corrosion resistance. Similar to "Gear Bronze" or "Hard Bronze" or "Phosphor Bronze" (usually alloys of Cu and 10% Sn).	Steam and pressure valve bodies; structural parts requiring hardness and fair strength. Bearings and bushings for high-duty work. Gears, cams, marine castings.
Leaded Tin Bronze	Navy "M"	88	6	1.5	4.5	—	40000	16000	30	Good	A more machinable version of Navy "G". Similar in properties to Navy "PC". Good marine corrosion resistance.	Steam or valve bronze bodies, especially for temperatures up to 550 F. Pressure castings, gears, bushings.
High Leaded Tin Bronze	80-10-10	80	10	10	—	—	35000	18000	15	Excellent	Good general purpose bearing and bushing alloy. Favorable combination of strength and bearing properties.	Bearings for high speed and heavy pressures. Roll-neck bearings. Bearings and pump bodies for acid mine waters or sulphite paper mill liquors.
High Leaded Tin Bronze	78-7-15	78	7	15	—	—	30000	16000	15	Excellent	Also called "anti-acid" bronze or "railroad" bronze. Good sulphuric acid corrosion resistance (in dilute concentrations).	Railroad journal bearings; wearing metal for railroads. General purpose bearing and bushing bronze. Coal mine bearings.
Red Brass	85-5-5-5	85	5	5	5	—	35000	17000	25	Excellent	Also known as "composition bronze" or "ounce metal" Best known of all copper-base alloys. Good general properties and foundry behavior.	Valves, small gears, plumbing fixtures, ornamental work, machine parts, pump bodies.
Red Brass	83-4-6-7	83	4	6	7	—	33000	15000	24	Excellent	Excellent alternative to 85-5-5-5. Comparable tensile properties and machinability with superior foundry behavior. Polishes and plates well.	Plumbing goods, hardware, non-stressed machine parts.
Yellow Brass	No. 1 Yellow Brass	66	1	3	30	—	35000	14000	35	Excellent	Most widely used of the yellow brass alloys. Good foundry behavior, with precautions taken to minimize "smoke" in melting.	Hardware and ornamental goods requiring high polish finish, air or gas fittings, some plumbing fittings, low pressure valve bodies.
Silicon Bronze		91	0.3	Si 4	4	—	55000	20000	40	Fair	Excellent general corrosion resistance; foundry characteristics good. Superior combinations of physical properties. Low electrical conductivity.	High pressure valve bodies, marine hardware, machine parts, cams, pump bodies; makes excellent bells.
Manganese Bronze	Low Tensile	57	Al 1	Mn 1	40	1	70000	30000	30	Fair	Excellent combination of high strength and good corrosion resistance in fresh and salt water. Casts well. Pleasing golden color. Can be used in die casting.	Ship's propeller wheels, marine hardware and fittings, gears, valve stems, lever arms, pump bodies.
Manganese Bronze	High Tensile	62	Al 5.5	Mn 3.5	26	3	110000	60000	12	Fair	High tensile properties. Superior corrosion resistance. One of the strongest of all non-ferrous casting alloys.	Large valve stems, spur gears, cams, bridge parts, gears, screw-down nuts, bearings (slow speed, heavy load), hydraulic cylinder parts.
Aluminum Bronze	89-1-10	89	Al 10	—	—	1	75000[1]	30000[1]	20[1]	Fair	Superior wear resistance, corrosion resistance, and good physical properties. Tensile properties can be improved by heat treatment.	Cam bearings, cam supports, pump impellers, valve nuts, crane gears, pickling pump agitators, bearing liners.
Aluminum Bronze	86-4-10	86	Al 10	—	—	4	85000[2]	30000[2]	25[2]	Fair	Excellent corrosion and wear resistance. Can be heat treated to give a wide range of properites.	Machine part bronze for severe conditions. Heavy duty bearing gears, worm wheels, slides, guide pin bushings.
Aluminum Bronze	82-4-4-10	82	Al 10	Ni 4	—	4	90000[3]	45000[3]	12[3]	Fair	One of the highest strength copper-base casting alloys. Good elevated temperature, corrosion, and bearing properties.	Valve guides, aircraft valve seats, heavy load bearing plates, gun mounts and slides, electrical connectors, gears, heavy duty machine parts.

Typical heat treated properties:

[1] Tensile strength, 90000 psi; yield strength, 45000 psi; elongation, 15%.

[2] Tensile strength, 100000 psi; yield strength, 45000 psi; elongation, 15%.

[3] Tensile strength, 115000 psi; yield strength 70000 psi; elonga tion, 5%.

other modifications that are of commercial importance. Perhaps the most widely used of all high-tin bronzes is the alloy known as Navy "M" with nominally 6 per cent tin, 1.5 per cent lead and 4 per cent zinc. This alloy combines good strength and ductility with machinability and corrosion resistance and finds application in many places where 88-10-2 or Navy "G" prove too difficult to machine.

Another widely used tin bronze is Navy "PC" containing 8.5 per cent tin, up to 0.90 per cent lead with 4 per cent zinc. This, also, is a machinable version of Navy "G" with generally good engineering properties. There are other alloys of similar nature but those described are the most widely used.

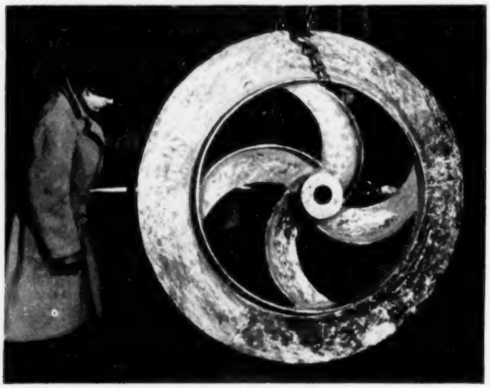
Applications of tin bronzes are extensive in engineering design. High pressure valves, fittings, machine components, gears, bushings and bearings and pump bodies are typical uses. The Navy uses large numbers of castings in "G" and "M" where excellent sea water corrosion resistance is necessary and good physical properties desired.

The tin bronzes present several problems to the foundryman. As a group these alloys have long freezing ranges and are fairly difficult to feed adequately in castings. This pronounced tendency toward interdentritic porosity also makes these alloys quite susceptible to porosity from dissolved gases. Because of the inherent difficulties in handling these alloys great care must be exercised in melting the metal, and in gating and risering the castings. This is especially true in making pressure castings.

Copper-Lead and Copper-Lead-Tin Alloys: Alloys of copper and lead alone are rarely used today. Lead does dissolve in molten copper but when the metal freezes it does not remain in the copper and, unless freezing is rapid, pronounced segregation of lead is likely. This type of alloy is used principally as a bearing or bushing. Such materials are quite difficult to handle in the foundry and few shops today are sufficiently experienced to handle the metal satisfactorily.

Of considerable economic importance are the alloys of copper, lead, and tin. Tin hardens copper, forming a strong matrix, while lead, which is not dissolved in

A 1200-lb impeller cast in corrosion-resistant silicon-bronze alloy by American Brass Co., Waterbury, Conn.



the copper-tin, serves as a plastic phase. The high-lead tin bronzes are widely used for bushings and bearings. A number of compositions are well known, including the 80 per cent copper, 10 per cent tin, 10 per cent lead alloy which offers a favorable combination of strength and bearing properties.

In this class is the 83 per cent copper, 7 per cent tin, 7 per cent lead, 3 per cent zinc alloy which is used more extensively than any other bearing composition. This alloy is sold widely as continuous cast bearing bronze or in chill-cast bars, and combines good wear properties with satisfactory physical properties.

When operating conditions are severe and lubrication difficult, the higher lead bronzes are popular. Two well-known alloys of this group are 78 per cent copper, 7 per cent tin, 15 per cent lead, and 75 per cent copper, 5 per cent tin, 20 per cent lead. These high-lead alloys have fair mechanical properties with considerable plasticity which enables them to conform to shaft dimensions when alignment is imperfect.

Good Foundry Practice Needed

The largest application of the copper-lead-tin alloys is as bearings or bushings. The 78-7-15 alloy is known as "railroad bronze" and is used extensively for railroad journal bearings. The 80-10-10 alloy finds some usage in pumps and valve bodies in coal mines where sulphuric acid corrosion is likely to be met.

The foundry characteristics of high-lead tin bronzes are a high degree of castability, a fairly strong tendency to dissolve gas in melting and the ever-present possibility of lead-tin segregation (sweat) on large sand castings. Large bushings of high-lead alloys frequently give foundrymen trouble, but good techniques will usually produce satisfactory castings.

Copper-Tin-Lead-Zinc Alloys: The best known of all copper-base casting alloys are those of copper, tin, lead and zinc. The most widely used alloy of this class —and most widely used of all copper-base foundry alloys—is 85 copper, 5 tin, 5 lead, 5 zinc, also known as 85-5-5-5 (85-three 5), composition bronze, red brass, or ounce metal (from the fact that it can be made by addition of one ounce each of tin, lead, and zinc to a pound of copper).

By far the bulk of bronze castings are made in "85" alloy with most specifications requiring the metal. The tin (and zinc) harden and strengthen the copper, the lead provides excellent machinability and the zinc improves the castability of the alloy. General properties of this alloy are good; tensile strength of 35,000-40,000 psi and elongations of 20-30 per cent. Machinability is excellent and foundry behavior very good.

Specify Proper Alloy

While as a general purpose alloy "85" usually proves quite satisfactory, unknowing adherence to use of "85" reduces the possibility of industry using the alloy best suited to a specific job. Far too many specifications call for castings in "85" because of lack of knowledge of more advantageous alloys on the part of the designer, and too many castings are made in "85" by the foundryman when no alloy is specified. It would be much more efficient for the foundryman to know the application of the casting and recommend the best alloy for that use, and so improve the product.

Closely related to 85-5-5-5 are two other alloys, 83 per cent copper, 4 per cent tin, 6 per cent lead, 7 per cent zinc, and 81 per cent copper, 3 per cent tin, 7 per cent lead, 9 per cent zinc, which have excellent foundry properties, casting more easily than does "85". Their mechanical properties are of the same magnitude as "85", and they machine well. For making the general run of unspecified bronze castings "83" and "81" offer not only good foundry performance but also advantages of economy. These alloys and their properties should be familiar to all foundrymen.

Cu-Sn-Pb-Zn Alloys Widely Used

The applications of "85", "83", or "81" metal run the gamut of all bronze castings uses. From machine parts to hardware, from plumbing fixtures to decorative ware, wherever a bronze casting is desired one of these alloys has been used—but not always to best advantage. In general, these alloys have proved satisfactory in the great majority of cases.

Foundry behavior of these alloys is good, and almost any good practice will produce salable castings. Gas porosity may occur if improper melting practices are followed and, as with all foundry alloys, adequate gating and risering are necessary to prevent shrinkage in the casting.

Manganese Bronzes: The alloys known under this name are not true bronzes and need not necessarily contain manganese. More properly they should be called high-tensile brasses since they are essentially 60-40 yellow brass with small amounts of aluminum, iron, and possibly manganese or tin. Aluminum and tin strengthen yellow brass appreciably; in fact, if both are used in a manganese bronze the amount of each present must be carefully controlled to keep the alloy from becoming too hard and brittle.

Aluminum is the most commonly used hardener; tin is used when additional corrosion resistance is desired. Iron is essentially a grain refiner with small effect on mechanical properties; manganese has almost no effect on properties directly but its presence in the high aluminum-high iron type of alloys may improve homogeneity.

Three types of manganese bronze are best known as low tensile (60,000-70,000 psi tensile, 30,000 psi yield strength, 20-40 per cent elongation), medium tensile (90,000 psi tensile, 45,000 psi yield, 20 per cent elongation), and high tensile (110,000 psi tensile, 60,000 psi yield, 12 per cent elongation). The latter two alloys have strength properties comparable to those of mild steel with good corrosion resistance except in salt water.

Low tensile manganese bronze is used in far greater tonnages than the other two alloys. It has high sea water corrosion resistance and higher strength properties than any of the tin bronzes. The two high strength alloys are frequently specified by the Navy for castings when service conditions are severe.

Gating Manganese Bronze Castings

Applications of manganese bronzes are varied. Practically all large ship propellers are cast in these alloys, and a large percentage of small boat propellers are also made from manganese bronze. Large quantities of marine hardware, substructure supporting members for boats, and machine operating parts are all made from one or another of these alloys. High tensile manganese bronze is frequently used for large packing nuts in rolling mill installations where exceptionally high as-cast strength is needed.

Despite occasional comment to the contrary, the manganese bronzes are not particularly difficult alloys to handle in the foundry. Because of high zinc content they are unlikely to dissolve gases or produce gas porosity in castings. They have short freezing ranges, and most shrinkage is external and readily corrected.

Internal shrinkage is uncommon in castings of manganese bronze. Adequate gating with fairly large risers is usually essential. Because zinc and aluminum oxides may form during melting and pouring and be trapped in the castings, the gating should be designed to minimize turbulence and agitation in the mold.

Nickel-Silver Alloys: The many alloys in this category contain copper with from 8 to 30 per cent nickel

Valves for dairy and brewing uses are cast in nickel silver. Courtesy of the Specialty Brass Co., Kenosha, Wis.

and varying amounts of tin, lead and zinc. Zinc contents range from 2-3 per cent up to 25 per cent. These alloys are especially well known for their white color and good corrosion resistance. Increasing the amounts of nickel and zinc increases the "whiteness."

Tin increases the hardness and strength, while lead improves the machinability. Almost an unlimited number of combinations of copper, tin, lead, zinc and nickel are used commercially. In fact, considerable confusion exists among the users of nickel silvers because of the varieties of alloys available.

Most commonly the alloys are listed by the amount of nickel present, with well-known compositions containing either 12, 15, 18, 21 or 25 per cent nickel. Zinc contents in any of these alloys runs as high as 25 per cent. Tin usually is limited to 4 or 5 per cent, with lead at about the same level. Tensile properties are related to the amount of tin present and the nickel-zinc ratio. The strength and ductility of these alloys may run as high as 50,000-60,000 psi tensile strength and 30-40 per cent elongation.

Principal applications of nickel-silver alloys are in food and beverage handling industries. Because of their white color and good corrosion resistance these alloys are widely used for food processing machinery, and in dairy and hospital equipment.

Foundry handling of nickel-silver alloys presents a

number of problems. Making sound, blemish-free nickel silver castings is fairly difficult. Because of their high nickel contents these alloys apparently are highly susceptible to gas porosity. Considerable care must be exercised in melting nickel-silver alloys to prevent the gas conditions which result in unsound pressure castings or surfaces which will not polish because of finely dispersed gas holes.

The presence of as much as 25 per cent zinc coupled with the necessity for high melting and pouring temperatures (because of the nickel content) offers the possibility of excessive dross formation. This dross often finds its way into castings and shows up on machining or polishing. Again, much care must be used in handling these alloys, especially in pouring castings. The nickel-silver alloys also require large gates and risers to overcome shrinkage in castings.

Silicon Bronzes: Of all the copper-base casting alloys perhaps no other group has the potentialities of the silicon bronzes. These alloys of copper and silicon, with zinc, tin, or manganese, have some of the best all-around properties of any brass or bronze alloys. High tensile and yield strengths or high ductility are available, with excellent casting properties in the foundry. High corrosion resistance is also characteristic of the alloy. Silicon hardens copper greatly; zinc, tin, iron, manganese all contribute to the generally excellent properties found in silicon bronzes.

Unusual combinations of mechanical properties are available. Tensile strengths up to 80,000 psi with 35 per cent elongation, or 50,000 psi tensile and 80 per cent elongation are possible. By varying the proportions of silicon and zinc in the alloys any number of desirable combinations of properties can be obtained. Along with these high mechanical properties the silicon bronzes all offer excellent corrosion resistance in a large number of media. The metal casts extremely well, and castings made from silicon bronzes are clean and smooth as they come out of the sand.

Zinc Content Affects Properties

Most of the well-known silicon-bronze alloys contain up to 5 per cent silicon, with zinc contents varying from zero to 15 per cent. Normally, the lower the zinc content the higher the ductility of the alloy. Increasing the zinc content raises the tensile and yield strengths while reducing the elongation. Tin, iron, and manganese contribute to the over-all strength of the alloy.

The silicon bronzes find unlimited applications. Some foundries use one of these alloys for any casting otherwise unspecified—just as many shops use "85" metal for run of mine castings. Marine hardware and fittings can be cast advantageously in silicon bronze, as can machine parts, valve bodies or pressure castings. There is almost no limit to the field of application of these versatile alloys.

Generally speaking, silicon bronzes are not difficult to handle in the foundry. Melting practice must be satisfactory to minimize the possibility of dissolving gases in the metal. Gating and risering must provide for casting shrinkage. The high degree of castability of the metal and the finish on sand castings make the silicon bronzes desirable for foundry use.

One problem involved in handling silicon bronzes should be pointed out. Contamination of leaded tin bronzes with silicon seriously reduces the properties of the leaded alloys. For this reason it is necessary to carefully segregate gates and risers from each type of alloy to prevent contamination.

Aluminum Bronzes: The group of copper-base alloys offering the highest strength, wear, and toughness of all brasses and bronzes are the aluminum bronzes, which are essentially alloys of copper and aluminum with iron. These alloys offer excellent combinations of tensile and yield strengths with good ductility, along with exceptional wear resistance and perhaps the best corrosion resistance of all copper-base alloys. If higher strength properties are desired, it is possible to heat treat certain of the alloys to improve the properties.

Aluminum greatly strengthens and hardens copper. The commercial alloys may contain from 6 to 13 per cent aluminum, with from 1 to 5 per cent iron. The iron refines the grain and apparently contributes to high tensile and yield strengths. Common alloy combinations are 89 per cent copper, 10 per cent aluminum, 1 per cent iron; 88 per cent copper, 8 per cent aluminum, 4 per cent iron; 86 per cent copper, 10 per cent aluminum, 4 per cent iron; and 82 per cent copper, 4 per cent iron, 4 per cent nickel, 10 per cent aluminum.

When the aluminum content is in excess of 12 per cent the alloys become extremely hard. It is possible to achieve a Brinell hardness of 325 in an alloy with 14 per cent aluminum. Such alloys find use in blanking or forming, or deep drawing dies in the steel industry because of the high tensile and compression strengths and excellent wear resistance.

The aluminum bronzes are used in a number of applications requiring high strength and corrosion resistance, such as electrical connections for power lines, cams, gears, sliding bearings, sleeve bearings, pump bodies, hydraulic cylinders, etc. Some special applications include nonsparking tools, dies, and high speed small boat propellers.

Foundry behavior of the aluminum bronzes closely resembles that of the manganese bronzes. These alloys, however, may dissolve gases in melting which can be a source of defective castings. Shrinkage characteristics are those of short freezing range alloys with possible piping and large external shrink holes. Large gates and risers are necessary. To minimize trapping aluminum oxide films in the casting the gating must be designed to have the metal flow quietly into the mold cavity. The great number of sound castings made in aluminum bronzes are ample evidence that with good technique these alloys are readily castable.

Wisconsin Chapter Issues Directory

Newly-issued is the A.F.S. Wisconsin Chapter's 1949-50 *Directory and Program*. Some 60 pages in all, paperbound and in a handy pocket size, the booklet contains names and business addresses of the Chapter's several hundred members. In addition there is a message from Chapter President R. C. Woodward, Bucyrus-Erie Co.; a history of the Chapter; a listing of 1949-50 officers and directors of both the Chapter and the Society; a brief history of A.F.S.; Chapter by-laws; a meeting calendar and resumé of the year's program; and a listing of various Chapter committees.

CLOSED TOP SYSTEM IN CUPOLA STACK EMISSION CONTROL

J. F. Drake
and
T. G. Kennard
Consultants
Los Angeles

Closed-top cupolas—a variation of the traditional gray iron melting unit—seem to offer means of controlling stack emission and a way of utilizing waste heat. Accordingly, when the Renfrow Foundry of Los Angeles wanted to reduce air pollution, the authors recommended and constructed a system consisting basically of:

1. A closed top similar to a blast furnace so that the system would operate under pressure.
2. A dry dust collector.
3. A wet washer.

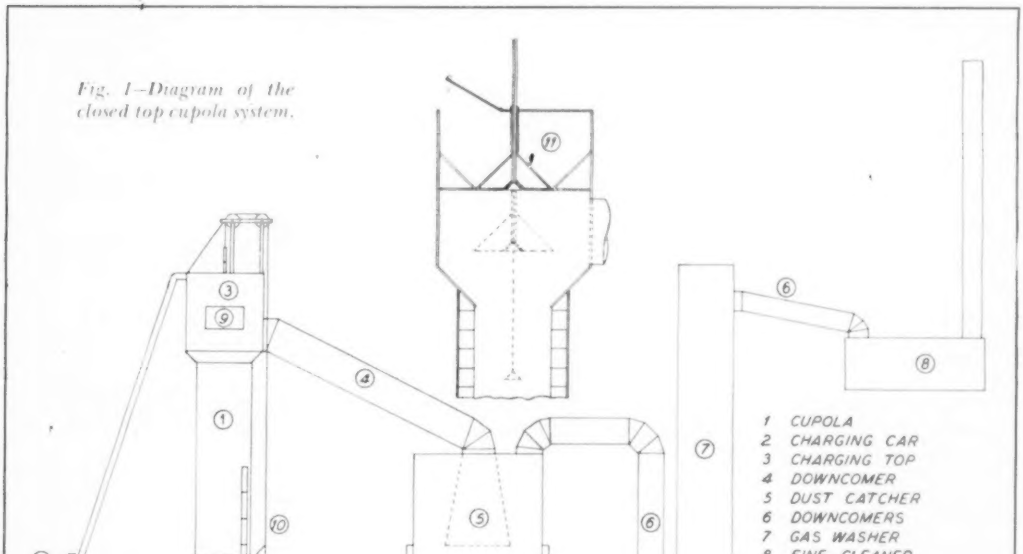
General construction of the system and a cross-sectional view of the closed top are shown in Fig. 1. The cupola has been operated regularly and satisfactorily since the installation of the closed-top system in Aug., 1948. It is a full-sized unit for commercial production rather than a test devise, and it withstands the operating conditions satisfactorily.

The important features of the dust-collecting equipment are that it is entirely closed—no fumes or dust escape from the cupola stack, nor is any extraneous air admitted. It does not require any auxiliary motors or blowers to pass the gases through, and it performs the necessary precleaning and conditioning so that a final cleaning unit such as a bag house or an electrical precipitator may be employed satisfactorily.

The primary dust collector accomplishes its purpose by reducing the velocity of the gas and directing it around a 180° angle; the wet washer is of the multiple-bed counter-current type, with multiple water nozzles and a type of packing on the beds which produces thorough washing of the gas without either channelling or increasing the back pressure excessively. An important feature of the whole system is the low temperature involved—high temperatures are avoided at the start, and the moderately hot gases are cooled first by radiation and then by the water washer.

The first metal was poured in Aug., 1948, the only difference in operation being that the scrap was required to be broken to a maximum of 18 in. or ½ the diameter of the cupola, and that the charge was required to be maintained at the 20-ft level. Prior to August 18 (on which date the stock line indicator was first used) uniform operation was difficult to achieve and temperatures varied considerably in the top of the cupola—at times approaching 1500F. The use of

Fig. 1—Diagram of the closed top cupola system.



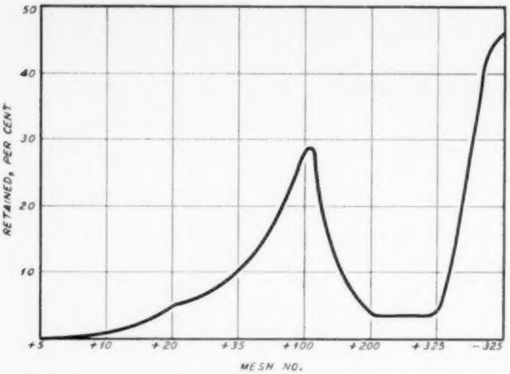


Fig. 2—Particle size distribution of cupola emissions.

the stock line indicator made it possible to maintain the temperature of the exit gas uniformly at near 600F.

A heat exchanger is not contemplated on this particular cupola except perhaps for the purpose of obtaining data. On larger cupolas with longer campaigns a heat exchanger for moderate heating of the blast may be the means by which the cost of the closed top and the other remedial equipment necessary for the control of the stack emissions will be justified. The cooling of the stack gases to some degree by means of a heat exchanger would also make possible the use of such cleaning devices as the glass bag.

Tests were made regularly on the amount of material removed by the dry dust collector and the washer, and the final tests were conducted on the effluent gas to determine the efficiency of the different packings used in the washer. The removal of from 40 to 50 per cent of the total particulate matter in the dust collector was according to expectations. The washer, however, presented a problem, especially when new regulations were published which limited emission to 0.47 grains per cubic foot based on tuyere air.

Cupola vs. Blast Furnace Dusts

On several occasions all but 0.26 grains per cubic foot were removed, but only by using a fine packing material which became plugged resulting in excessive pressures in the washer. Using a packing which did not impede the passage of the gases, it was possible to remove all but 0.60 grains per cubic foot. This still left approximately 2½ pounds per hour, in excess of regulations, in the effluent gas.

Compared to the experience of others in the cleaning of gases—Boynton, and Clingerman and Fleisch in blast furnace dust control—the results obtained were so inadequate that the authors were convinced that the particulate matter in the cupola is vastly different from that in blast furnace gases, being much finer and lighter and of different chemical composition, particularly in the lower iron content in all of the sizes and the increasing zinc and lead content as the size decreases. The much greater distance between the reduction zone and the top of the stack in the blast furnace, together with the earthy nature of the burden, may act as a filter in the removal of the finer particles which originate in the region of the reduction zone.

If this is true, the dust content of the blast furnace gas is due more to the dusting of the ore, coke and limestone during the charging process and to the settling of the charge in the upper part of the furnace, rather than the production and condensation of fine particles and metalloids in and above the melting zone such as seems to occur in the cupola. The difference in the composition of the charge is also responsible for the difference in other physical properties of the particulate matter. The resistance to wetting, for instance, may be due to the small amount of oil and grease that is present in the scrap charge, or to the high lead and zinc content, or both.

The dry dust collector regularly removed almost 50 per cent of the total particulate matter in the raw gas. This amounted to 1.9 to 2.5 grains per cubic foot. Not only did the device act as a buffer in the system to take care of sudden surges of gas in the event of uneven charging, but it greatly lightened the load on the washer by removal of material which would be a problem in the recirculation of the water both because of the abrasive nature of the larger particles and their high sulphate content.

Table 1 shows an average screen analysis of the material which accounted for over 95 per cent of the plus 325 mesh particles. Many of these particles were distinctly magnetic, as shown in Table 2: separation was made by means of a powerful permanent magnet.

Measurements were also made of the relative amounts of the heavy and light particles in the various sizes, using liquids of Sp. Gr. 1.81 and 2.90 as the separating medium. As shown in Table 3, these density measurements were not at all in agreement with the

TABLE 1—AVERAGE SCREEN ANALYSIS

Screen	Per Cent
+ 5 mesh	0.1
− 5 + 9	1.1
− 9 + 12	10.7
−20 + 35	20.4
− 35 + 100	57.0
−100 + 200	7.5
− 200	3.2

TABLE 2—MAGNETIC PROPERTIES

Size	Magnetic, %	Non-Magnetic, %
+ 5	84.3	15.7
− 5 + 9	64.3	35.7
− 9 + 20	53.2	46.8
− 20 + 35	48.1	51.9
− 35 + 100	55.5	44.5
− 100	62.3	37.7

TABLE 3—PARTICLE DENSITY MEASUREMENTS

Size	Heavier than 1.81	Lighter than 1.81
− 9 + 20	42.4%	57.6%
− 20 + 35	65.6	34.4
− 35 + 100	83.5	16.5
− 100	73.0	27.0
	Heavier than 2.90	Lighter than 2.90
− 35 + 100	under 0.1%	over 99.9%
− 100	6.3	93.7

TABLE 4—CHEMICAL COMPOSITION

Size	Fixed Carbon	Lead Pb	Zinc Oxide ZnO	Sulphur Alk. Sol.	Sulphur Water Sol
Composite + 100 mesh	7.40-13.90	0.21-0.34	0.74-0.87	0.60-0.63	0.40-0.42
Composite − 100 mesh	16.80-22.80	0.34-0.55	1.02-1.51	0.39-0.54	0.23-0.40

popular conception that the larger particles emitted from a cupola stack are primarily iron oxide.

Chemical analysis of this dry dust shows a surprising amount of lead and zinc as well as significant amounts of sulphur. The lead and zinc varied somewhat depending on the type of scrap charged. An average range of values is given in Table 4. These quantities of sulphur, which were extracted by boiling with dilute sodium hydroxide and water, respectively, are considered especially significant since they indicate that these emission particles may be the direct cause of much of the chemical attack occurring in and around iron foundries.

The performance of the tower washer, while disappointing in that the Los Angeles Air Pollution Regulations could not regularly be met, did remove a substantial percentage of the particulate matter left in the gas by the dry dust collector. The entering gas contained from 2.0 to 3.0 grains per cubic foot or from 40 to 60 lb of particulate matter per hour of cupola operation. Over 95 per cent of the material was finer than 44 microns with the larger percentage below 10 microns in size. A range of chemical compositions for the solids obtained by evaporating the washings is given in Table 5.

Results in many tests by the Air Pollution Control Laboratory and the authors indicated that the gas leaving the washer still contained between 0.55 and 0.70 grains per cubic foot or from 11½ to 14½ lb of particulate matter per hour of cupola operation, and a large amount of entrained water.

To obtain large samples of the fine material remaining in the effluent gas from the tower washer, the authors first installed a water eliminator after the washer, then a means of passing a small portion of the gas through a bag filter. The material so obtained was examined microscopically to determine the particle size and analyzed chemically to determine the composition.

The material is extremely fine, being primarily under 5 microns in size, with the bulk of 1 micron, or less, and of low specific gravity and wetability. The chemical analysis of an average sample representing several runs is given in Table 6. The lead, zinc, and sulphur contents apparently increase with a decrease in particle size. This may also be true for manganese; however, insufficient work has been done to determine this point definitely.

Conclusions

1. The closed top appears to be a necessary part of any system of emission control on a cupola that requires the degree of gas cleaning necessary to meet regulations, such as those of the Los Angeles County Air Pollution Control District. The high temperatures and large volumes of gas encountered because of dilution through the open charging door make other methods impracticable.

2. The total particulate matter emitted from the cupola stack, under normal operating conditions, appears to vary from 30 to more than 45 lb per ton of iron melted, of which 40 to 50 per cent is coarse (plus 325 mesh). The balance is extremely fine (minus 325 mesh), the greater portion less than 5 microns, low in specific gravity and high in lead, zinc, and sulphur.

3. Due to the extreme fineness, low specific gravity, and low wetability of the particulate matter, it will be necessary in order to meet the more stringent regulations, such as those of Los Angeles County, to follow the washer with either a bag house or an electrical precipitator. Where regulations permit, packing the tower washer with spiral tile may prove satisfactory.

4. Ordinary washers on top of the cupola stack probably do not remove over 40 or 50 per cent of the particulate matter due to its low specific gravity and low wetability, extreme fineness of a large percentage, and to the high temperatures and volume of gas.

5. Operation of a closed top cupola presents no unusual difficulties. No explosion hazard exists because the gas is confined and the temperature is far below the ignition point. The carbon monoxide in the gas will require the same precautions that have long been observed by blast furnace operators.

Adoption of closed-top cupola practice naturally will result in the utilization of either the sensible or latent heat of the gas, or both, to heat the blast and for other uses in and around the plant. It is possible that fuels not now regularly used, such as ordinary grades of coke and briquetted coke breeze will replace at least a part of the foundry coke in those localities where distance from sources of supply is a factor.

TABLE 5—COMPOSITION OF SOLIDS OBTAINED BY EVAPORATING WASHINGS

Component	Per Cent
Silica, SiO_2	10.0-25.0
Alumina, Al_2O_3	2.0- 4.0
Iron, Fe	4.0- 9.0
Lime CaO	4.0-11.0
Magnesia, MgO	2.0- 5.0
Manganese, Mn	1.0- 2.2
Lead, Pb	2.8- 5.7
Zinc Oxide, ZnO	2.1- 3.5
Sulphur, S	2.1- 2.4
Loss on Ignition	40.0-50.0

TABLE 6—COMPOSITION OF FINE MATERIAL IN GAS PASSING THROUGH WASHER

Component	Per Cent
Silica, SiO_2	28.40
Iron, Fe	5.18
Alumina, Al_2O_3	12.73
Calcium Oxide, CaO	0.29
Magnesium Oxide, MgO	0.54
Manganese Oxide, MnO	7.96
Lead, Pb	13.89
Zinc Oxide, ZnO	3.08
Carbon	5.64
Sulphur, SO_3	12.86
Phosphorus	0.192

Issue FEF Informational Directory

Pertinent information on cooperating universities of the Foundry Educational Foundation is now available in a four-page folder. Listed are key faculty members for foundries to contact at each of the 12 cooperating universities, as well as names of FEF officers and trustees, advisory committee members, trustees-at-large and campaign staff members.

Of particular value to company personnel and placement directors planning to contact engineering school graduates or students for summer work, the *Directory of Pertinent Information* is available free-of-charge from the Foundry Educational Foundation, Terminal Tower Bldg., Cleveland 13, Ohio.

FACTORS INFLUENCING CORE SAND SELECTION

Joseph P. Avylla
Philadelphia Naval Shipyard
Philadelphia

Core sand selection is of the utmost importance in any foundry. The proper selection of core sand is just as important to the foundry in maintaining satisfactory sand heaps as it is to the core room in maintaining satisfactory core sand mixtures. Foundry sand heaps, or systems, may be partially or wholly maintained by addition of new sand through the disintegration of the cores at the shakeout.

Core sand may vary widely in its characteristics and still make good castings. However, a few things should be kept in mind in selecting a core sand. It is usually well to use a rounded or sub-angular grain sand of 45 to 100 A.F.S. Fineness (depending on the type of cores to be made) fairly well sorted and substantially free from fines and clays, salt, lime, and vegetable matter. So many interdependent factors enter into the selection of proper core sand that it is impossible to describe an acceptable universal core sand.

In general, a sharp sand of high base permeability is desirable because it can be blended with a finer sand, such as a bank sand, to obtain very closely controlled permeability in the correct range for the particular application of the sand mix. In heavy, chunky cores for large castings, as much as 2 or 3 per cent clay content often is desirable, and up to 15 to 20 per cent where naturally bonded sands are used for very large cores. The clay helps to provide the necessary green strength for the large cores, and contributes appreciable hot strength to resist cutting and washing.

A core mixture should be so designed that it will:

1. Have strength in proportion to the strength of the particular metal at elevated temperature and during freezing. A core that maintains its strength over too long a period under heat may cause hot tears or cracked castings.

2. Collapse at the proper time during the solidification of the particular metal. It has been determined that a core increases in strength up to a certain temperature, passes through a plastic range, and finally decreases rapidly in strength. Theoretically, the core should maintain its strength until the metal has formed a sufficient skin around it, and then should lose its strength rapidly as the metal begins to contract, thus avoiding casting strains and possible hot tears and cracks. Metals are at their lowest strength immediately after solidification.

3. Present the proper surface to the metal to prevent metal penetration in the core because of high fluidity or other causes.

4. Be sufficiently hard to resist the flow of molten metal along or over its surface. Failure to do so may result in cuts, washes, and other defects.

5. Be resistant to the heat contained in the metal at its pouring temperature.

6. Be unaffected by mold or other atmospheres generated by the molten metal. Little is known about the behavior of cores in the presence of various atmospheres, but it is thought that such atmospheres may exert an influence and core mixtures must be compounded to resist such possible reactions.

7. Not lose too much strength during storage.

8. Not absorb excessive moisture during storage, should storage be necessary, or in the mold if the mold stands for a considerable period before it is poured.

9. Withstand required handling without breakage.

10. Hold its proper shape both before and during the baking period.

11. Bake thoroughly and rapidly, thus requiring a minimum of core baking equipment.

12. Produce as little gas as possible when molten metal comes in contact with the core.

13. Possess smoothness of surface and thus produce a smooth surface on the casting.

14. Possess the proper degree of permeability to allow for egress of gases formed during pouring.

15. Be easily removed from the casting, thus keeping cleaning cost at a minimum.

16. Not stick in or otherwise foul the core box.

Note: This article is excerpted from a lecture given as part of last year's 20-week Foundry Course, sponsored by A.F.S. Philadelphia Chapter.

Scholarship Awarded Texas A & M Student Chapter President

Recent recipient of an honorary financial scholarship from Texas Foundries, Inc., Lufkin, was Uvalde Stoermer, senior mechanical engineering student at Texas A & M College and president of the A.F.S. Student Chapter there. Shown at the presentation at Texas Foundries are, left to right: Robert Bradshaw, company vice-president; Texas Foundries President Cal C. Chambers, Mr. Stoermer, and Scott Sayers, former Texas A & M graduate, now company personnel manager.

Questions — THE ROUND TABLE — Answers

Risering Nodular Iron

What can you tell us about the use of insulating material to cut down the size of risers for nodular iron castings?

Insulating sleeves of gypsum, and of diatomaceous earth bonded with a resin and bentonite, have been used for a number of casting alloys. Diatomaceous earth sprinkled on the top of risers has some insulating value; some of the proprietary exothermic riser compounds should also prove useful in nodular iron.

Recently we heard a foundryman say he had started out risering nodular iron castings according to approved steel foundry practice but now—as he gains experience—his risers for nodular iron more nearly approach typical gray iron practice. Perhaps AMERICAN FOUNDRYMAN readers with nodular iron experience will pass on their suggestions for publication.

Needs Aluminum Sponge

The Office of Domestic Commerce, Department of Commerce, Washington, D. C., advises that you possibly could give information on casting porous aluminum. The porosity we have in mind should be fairly uniform and if possible should reduce the volume of aluminum so that the total voids are greater than the total aluminum in a given area. We realize that the object in standard foundry practice is to produce void-free castings—but our need is for the opposite.

No commercial procedure for production of aluminum alloy castings with a large volume of uniformly distributed voids has come to our attention. Castings with a degree of porosity undoubtedly could be made by severely gassing the molten metal with some material that would introduce a large quantity of hydrogen and casting a heavy section in a mold with high insulating properties in order to retard solidification. Even this could not be expected to provide a volume of voids in excess of the volume of aluminum.

Possibly an experimental procedure could be developed to produce the desired void content by means of a low melting point metal with a low solid solubility in aluminum. A high percentage of this metal might be added to the melt, thoroughly stirred, and cast. Heating the casting to a sufficiently high temperature to melt the low melting metal might permit it to flow out of the casting leaving the desired voids.

This approach might not be effective because a low melting metal with little solubility probably would be present as globules in the solid casting. There is considerable doubt that there would be any network of this metal which upon melting would leave channels for the low melting metal to pass out of the casting.

While there is no established commercial method for the desired high void content in aluminum castings it might be feasible to produce them some way. An extensive investigation undoubtedly would be required to establish the method.

Casting Grinding Balls

I am interested in the techniques and manufacturing methods of producing alloy cast iron grinding balls such as are used in cement mills and for treating other abrasive materials.

For the most part these are made of chilled iron or highly alloyed compositions containing several percent each of nickel and chromium. Several proprietary alloys of the latter type are widely used for resistance to abrasion. Permanent iron molds and water-cooled copper molds are used to a considerable extent in grinding ball production but they are also cast in sand. Alloys giving hardnesses of the order of 700 BHN are used in many instances; where resistance to shock is essential a Brinell hardness of about 500 obtainable in a martensitic iron may be used. The technology of producing white and alloyed irons is well covered in the A.F.S. publications CAST METALS HANDBOOK and ALLOY CAST IRONS HANDBOOK and these might well be consulted.

High Steel Cupola Charges

Pig iron is impossible to get, cast iron scrap is becoming more difficult to procure, but we are able to obtain all the steel scrap we want in the form of rounds one to four inches in diameter and from two to six inches in length. How large a percentage of steel can we use in our cupola?

You will encounter increasing difficulty as you extend the amount of steel scrap in the cupola charge above the 25 per cent you are now using. Primary trouble will be in achieving adequate carbon pick-up. Slow melting, use of petroleum coke, or briquets of graphite in the charge will assist somewhat in increasing the carbon. The steel should be charged directly onto the coke to achieve maximum carbon absorption and it is necessary to allow additional coke for this. Carbon absorbed may be as high as about 0.60 per cent with approximately 25 per cent steel in the charge to about 1.5 per cent when 75 per cent of the charge

is steel. An excellent discussion of this is contained in "*Controlling Carbon in the Cupola*," by W. W. Levi, Lynchburg Foundry Co., Radford, Va., AMERICAN FOUNDRYMAN, October, 1947, page 28.

If steel scrap can be obtained at a sufficiently low figure you might consider making your own pig iron by melting an all steel or nearly all steel charge.

Suggested Seacoal Analysis

Where can we get a specification or recommended analysis for seacoal?

American Foundrymen's Society does not publish a specification for seacoal, each foundryman working out his needs for specific applications with the various suppliers. As a guide you might find the following information helpful:

1. Water preferably not over 2 per cent.
2. Volatile matter not less than 35 per cent (usually will run from 35 to 40 per cent).
3. Ash not over 5 per cent.
4. Fineness should generally be not less than the A.F.S. fineness for the sand in which the sea coal is to be used. For example, a foundry using a sand with an A.F.S. fineness of 55 would normally specify a seacoal fineness of 50 to 60.

Bonding Magnesite Brick

In our experimental work we are trying to make magnesite brick for a basic electric furnace. What chemical bond and pressure are necessary?

One chemically bonded magnesite brick is made with sulphuric acid. Pressure is 15,000 psi.

R. P. Heuer, *Vice-President*
General Refractories Co.
Philadelphia

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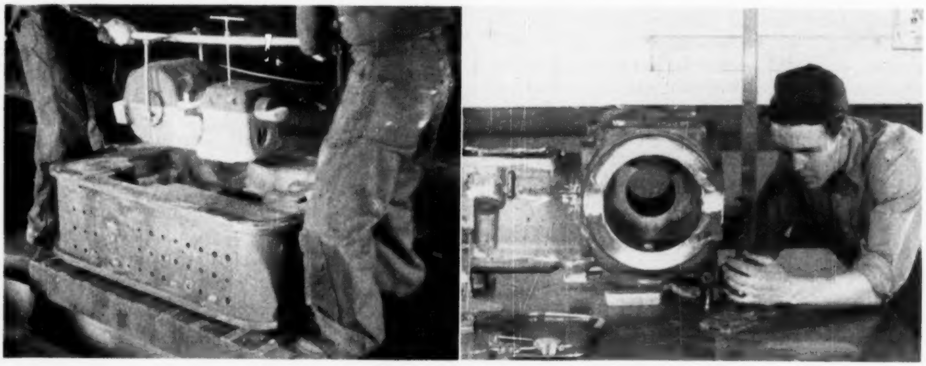
The discount plan was recently put into effect by the A.F.S. National Office at the request of chapter officers attending the Chapter Officers' Conference last summer in Chicago, who suggested that A.F.S. publications be displayed at all chapter meetings as a membership aid.

Refractory Institute's Materials Data Bulletin Is Now Available

RECENTLY ISSUED and available from the American Refractories Institute is "A Specification for Single- and Double-Screened Ground Refractory Materials," written by S. M. Phelps, director of research and tests, Refractories Fellowship, Mellon Institute, Pittsburgh 13, Pa. Also included in the 8-page pamphlet, available from Mr. Phelps, is a section on "Proposed Specifications for Single- and Double-Screened Ground Refractory Materials," containing requirement tables.

Lynchburg Foundry's "Men and Molds" Describes Plant Operations



Pictured above are scenes from the new film, "Men and Molds," *produced by the Lynchburg Foundry Co., Lynchburg, Va., showing operations in Lynchburg's modern, mechanized, mass production foundry. Shown at left above is a green-topped core being set in a mold, and at right check being made of dimensional accuracy of a casting. Beginning with a flashback to Lynchburg's early days, film shows phases of casting production, and the variety of products made by the casting process. Complete with professional narration and music, this 35-minute film is available to interested groups at no cost except for postage to and from destination from Joseph E. Foster, Technical Assistant, A.F.S. Headquarters, 222 West Adams St., Chicago 6, Ill.*

MnSi AND FeSi DETERMINATIONS IN MANGANESE BRONZE

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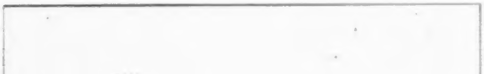
SEGREGATION of manganese silicide and iron silicide in manganese bronze is not always avoidable. The conditions influencing segregation are numerous[1] and cannot always be controlled. When passing from the liquid to the solid state manganese bronze has a tendency to form dross and scum.[2] In some cases sludge contamination occurs on pouring, causing "hard spots." In many cases "hard spots" are associated with the segregation of iron. Also, it is generally accepted that when iron and manganese become oxidized they combine with the nearest available silica to form a slag. Since small amounts of slag occlusions in manganese bronze affect some of its physical properties, it becomes increasingly important to determine the amount present.

In many instances the total iron and manganese in manganese bronze are present only in the form of silicides. When that occurs routine analysis fails to detect those elements and the analysis is incomplete. When both forms (alloy and silicide) are present in the bronze, routine analysis detects only the alloy form, and again the analysis is incomplete. When only traces of silicides are present they can be ignored in the ordinary routine analysis. Larger amounts should be isolated and the amount reported. The method outlined for the determination of silicides is simple and can be employed in ordinary laboratory practice.

The determination of non-metallic inclusions in alloys has been reported by several workers. In the pioneer work of Skapski and Benedicks[3] it had been established that it is possible to treat thin specimens chemically and isolate in situ the content of slag inclusions. The method, however, is rather complicated and requires considerable skill and apparatus for vacuum work. A more simplified procedure has been worked out by Benedicks and Tenow.[4] A procedure for the determination of sulphide inclusions of iron and manganese in the metal of welded joints has been worked out by E. E. Cheburkava.[5]



Photomicrograph of unetched specimen of manganese bronze showing the beta structure and cube-like slag inclusions (FeSi) distributed in the matrix. X500.

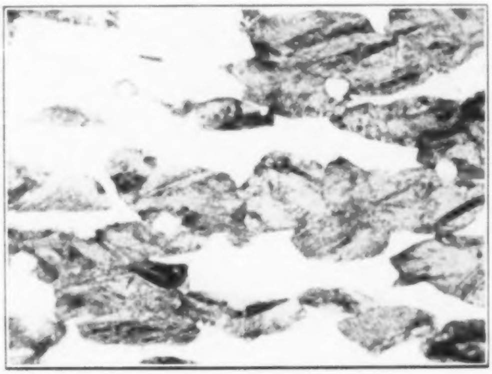
Procedure

The selective solubility method employed by this author for isolating inclusions in manganese bronze has been tried and proven satisfactory. X-ray diffraction patterns of isolated slag inclusions revealed the presence of FeSi and MnSi. The MnSi is of simple cubic structure with lattice parameter 4.54 angstroms. The FeSi is of similar cubic structure with lattice parameter 4.46 angstroms.

Dissolve a 1-gram sample in 100 ml of 5 per cent nitric acid at room temperature, warming occasionally to accelerate solution, but do not boil. Filter, while warm, through a close texture filter paper, and wash precipitate and paper with warm 3 per cent nitric acid solution, to ensure removal of all traces of copper. (*Caution:* precipitate has a tendency to creep.) Transfer precipitate and paper to a platinum or nickel crucible and ignite at about 700 C for about 1 hr. Cool and weigh. The ignited precipitate contains all the silicides.

Place five or six pellets of sodium hydroxide in a crucible, add 2 ml of water and warm contents on a low temperature hot plate at a temperature low enough to prevent sputtering until the sodium hydroxide dissolves. Remove the crucible from the hot plate and allow to cool somewhat. When cool add six to eight

Manganese bronze specimen etched to enhance structural delineation and bring out needle-like structure of the alpha. The cube-like slag inclusions (FeSi) are scattered in the alpha and beta. The etchant used consists of 1 part H_2O_2 (3%), 2 parts NH_4OH, and 3 parts H_2O. The specimen is dipped in the etchant for 8 sec, rinsed with water and alcohol, and air dried. X500.



drops of 3 per cent hydrogen peroxide and warm. Remove from the hot plate, cool, add several drops of hydrogen peroxide and warm. Repeat this process three or four times. This ensures complete disintegration of silicides and conversion to silicate. Avoid excessive heating and guard against mechanical loss through sputtering.

The silica is determined in the following manner: remove crucible from hot plate and cool, dilute with about 10 ml of water and pour contents of crucible into a 250-cc beaker containing 50 ml of water, 10 ml concentrated sulphuric acid, 5 ml concentrated nitric and 5 ml concentrated hydrochloric acid. Rinse crucible several times with water, wash down the sides of the crucible using about 10 ml of 1:1 hydrochloric acid, police if necessary, and transfer to the beaker.

Place the beaker on the hot plate and evaporate until heavy fumes of sulphuric acid are evolved. Fume vigorously to dehydrate the silica. Remove from hot plate and cool, dilute with 100-cc of water, and stir to ensure complete solution of salts. Immediately filter through a medium texture paper, and wash precipitate and paper with hot water—5 or 6 washings will suffice. Transfer the paper and residue to a platinum crucible, heat carefully until completely charred, and then ignite for about 20 min at 1000-1050 C. Cool in a desiccator and weigh.

Moisten the precipitate with three to four drops of 1:1 sulphuric acid, and then add 5 ml of hydrogen fluoride. Evaporate to dryness, carefully heat until all sulphuric acid is driven off and then ignite at 1000 C. Cool in a desiccator and weigh. The difference between the first and second weights is the amount of silica in the form of silicides in the sample. If there is any residue in the crucible fuse with potassium bisulphate and extract melt with hot water. When solution is complete combine with filtrate from the silica.

The solution contains all the manganese and iron. Divide solution into two equal parts and determine iron in one and manganese in the other. Determine iron by boiling solution with test lead for 20 min, cooling, and titrating with standard permanganate. Determine manganese by either the periodate or bismuthate methods. The total weight of silica, manganese, and iron determined separately should correspond closely to that of the ignited precipitate.

If tin is present in the sample, the foregoing procedure is slightly modified. It has been the author's experience that tin offered no interference in samples with less than 0.2 per cent tin content. The precipitate including the tin is filtered, washed, and ignited as outlined in the procedure, but not weighed. The ignited precipitate is treated as above until the fuming stage. When fuming, the tin is eliminated by fuming with hydrobromic acid. The silica is filtered and the precipitate and filtrate are treated as outlined.

Many samples of manganese bronze have been analyzed in this laboratory. The results obtained on slag inclusions have proven the validity of the method. The method for determination of silicides of iron and manganese in manganese bronze can be applied to manganese bronze welding rods and weld materials.

Acknowledgment

Permission by the U.S.N. Engineering Experiment Station to publish this paper is gratefully acknowledged by the author.

The opinions expressed in this paper are those of the author and are not necessarily official opinions of the U.S.N. Engineering Experiment Station or the Navy Department.

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Cast Steel Benthoscope Used in Deep-Diving Project

Experimental dives to explore the ocean at depths much greater than those previously reached were conducted in August, 1949, by Otis Barton, inventor of the benthoscope, and the Allan Hancock Foundation of the University of Southern California. Designed to withstand pressures at depths exceeding 10,000 ft, the benthoscope is made of cast nickel-molybdenum steel with tensile strength of 90,000 psi and yield point of 70,000 psi. The thinnest wall sections are 1¾ in., with much thicker wall sections near the windows and other openings to eliminate stress concentrations.

New AFS MEMBERS

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Johnson-March Corp., Philadelphia—George A. May, Vice Pres. (Philadelphia Chapter).

Pacific Oxygen Co., Oakland, Calif.—William Josephian, Mgr. (Northern California Chapter).

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W. K. Bach, Sales Mgr., Foundry Service Co., Birmingham, Ala.

BRITISH COLUMBIA CHAPTER

Robert Alfred Anslow, Molder, Sumner Brass Foundry, Vancouver, B. C., Canada.

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Frank A. Sweterlitsch, Pattern Fmn., United Engineering & Foundry Co., Canton, Ohio.

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CENTRAL MICHIGAN CHAPTER

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Roger Huffman, Sales Engr., Albion Malleable Iron Co., Albion, Mich.
Walter Millar, Fdy. Supt., Battle Creek Foundry Co., Battle Creek, Mich.
William E. Robb, Salesman, A. P. Green Fire Brick Co., Detroit.

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B. J. Lazan, Prof. and Head Dept. of Materials Engrg., Syracuse University, East Syracuse, N. Y.
Clarence T. Patterson, Met., Solvay Process Div., Allied Chemical & Dye Corp., Syracuse, N. Y.
H. K. Salzberg, Chemist, Borden Co., New York.
Marshall W. Stevens, Fdy. Met., General Electric Co., Elmira, N. Y.

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Stanley P. Zolenas, Appr. Instr. and Fmn. of Non-Ferrous Fdy. Bethlehem Steel Co., Sparrows Point, Md.

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Thomas W. Hansen, Salesman, Hickman-Williams & Co., Chicago.
Robert C. Johnston, Salesman, Hickman-Williams & Co., Chicago.
Herbert W. Kelly, Chicago.
C. Malcolm MacKenzie, Sales Engr., J. O. Ross Engineering Corp., Chicago.
Paul M. Malarik, Core Room Fmn., Continental Foundry & Machine Co., E. Chicago, Ind.
John J. McDonald, Asst. Fmn., Crane Co., Chicago.
Joseph A. Mulvey, Fmn., Crane Co., Chicago.
P. H. Parker, Supt., Roll Fdy., Continental Foundry & Machine Co., E. Chicago, Ind.
Russell Tucker, Jr., Sand Technician, Pettibone Mulliken Corp., Chicago.

CINCINNATI CHAPTER

Edward L. Bohn, Jr., Student, University of Cincinnati, Cincinnati.
Harry Robert Dwyer, Student, University of Cincinnati, Cincinnati.
John L. Shinn, Sales Engr., Dayton Malleable Iron Co., Dayton, Ohio.

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Harold E. Davis, Vice Pres., Morse Pattern & Manufacturing Co., Detroit.
Martin J. Ewald, Counsel, National Foundry Assoc., Detroit.
Ferit M. Samikoglu, Mech. Engr., Albert Kahn, Inc., Detroit.

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James R. Bodwell, Molder, General Electric Co., Schenectady, N. Y.

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George J. Antrobius, Engr., American Brake Shoe Co., Southern Wheel Div., New York.
George Norwitz, Chemist, Material Lab., N. Y. Naval Shipyard, Brooklyn, N. Y.

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T. C. Wertz, Supt., Williams Bros., Inc., Elkhart, Ind.

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Raymond Kraus, Trainee, National Malleable & Steel Castings Co., Cleveland.
James O'Keefe, Jr., Engr., Exomet, Inc., Conneaut, Ohio.
Donald R. Toth, Trainee, National Malleable & Steel Castings Co., Cleveland.

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Wm. W. Clark, Met., Pittsburgh Testing Laboratory, San Francisco.
Frank Gniadek, Owner, Bay City Pattern Co., Oakland, Calif.
Carrol W. Hillcourt, Owner, C. T. Jacobsen Pattern Maker, San Francisco.
Pacific Oxygen Co., Oakland, Calif., William Josephian, Mgr.
A. S. W. Love, Treas. & Gen. Mgr., American Brass & Iron Foundry, Oakland, Calif.
William F. Skeer, Western Mgr., Exothermic Alloys Sales & Service, Inc., San Carlos, Calif.

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Stanley M. Pazera, Asst. Core Room Fmn., Greenlee Brothers & Co., Rockford, Ill.

NORTHWESTERN PENNSYLVANIA CHAPTER

Charles Jarecki, Retired, Erie, Pa.
Garfield A. Jenkins, Yard Mgr., Luria Brothers & Co., Erie, Pa.

OREGON CHAPTER

Nowman E. Hall, Pattern Clerk, Electric Steel Foundry Co., Portland, Ore.

PHILADELPHIA CHAPTER

Johnson-March Corp., Philadelphia—George A. May, Vice Pres.
Gerare L. Smith, Fdy. Supt., York Corp., York, Pa.

ROCHESTER CHAPTER

Isadore Caplan, Student, University of Rochester, Rochester, N. Y.
Wm. B. Sattler, Sales Engr., Whitehead Brothers Co., New York.

SAGINAW VALLEY CHAPTER

Donald J. Benner, Lubrication Engr., Cities Service Oil Co., Detroit.
Harry D. Macy, Laboratory Physicist, Buick Motor Div., G.M.C., Flint, Mich.

SOUTHERN CALIFORNIA CHAPTER

Jonmore Dickason, Vice Pres. & Gen. Mgr., Metal Control Lab., Los Angeles.
Armistead W. Thomas, Salesman, Pacific Graphite Co., Los Angeles.

TENNESSEE CHAPTER

Charles H. Arnold, Salesman, Porter Warner Industries, Chattanooga, Tenn.

TWIN CITY CHAPTER

Norman E. Wisner, Wisner & Co., Minneapolis.

WESTERN MICHIGAN CHAPTER

Franklin L. Cornelius, Vice Pres., Wolverine Brass Works, Grand Rapids, Michigan.
Otel Levan, Supt., Cleaning Room No. 3., Lakey Foundry & Machine Co., Muskegon, Mich.

WESTERN NEW YORK CHAPTER

Arthur L. Baumgarden, Owner, National Pattern Works, Buffalo, N. Y.

WISCONSIN CHAPTER

Walter E. Jahnke, Student, University of Wisconsin, Madison, Wis.
Thomas Pierce McCarthy, Apprentice, International Harvester Co., Milwaukee.
Robert C. Penner, Pres., Interstate Supply & Equipment Co., Milwaukee.

STUDENT CHAPTERS

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

William Lloyd Clemons
Maurice C. M. Grandpierre
Frank F. Smith, Jr.
Leo E. Weaver, Jr.
James Wong

MICHIGAN STATE COLLEGE

Willard L. Cordes

MISSOURI SCHOOL OF MINES

Jack Richard Bodine
Fred Henry Eckert

OREGON STATE COLLEGE

Charles H. Coey

UNIVERSITY OF ILLINOIS

Burton Amos
Robert Banac
Dale Besterfield
Roger C. Blake
Stephen Maurice Cobb
David L. Day
Lawrence A. Gregory
John H. Rice

UNIVERSITY OF MINNESOTA

Arthur F. Christensen
George K. Granse
John P. Hagen
Steve Hicks
David B. Johnson
Delbert N. Le Claire
Robert A. Manson
Melvin P. Schroeder
Gerald A. Sporre

OUTSIDE OF CHAPTER

Barz V. Greenwood, Jr., Asst. Met., Pittsburgh Rolls Div., Blaw-Knox Co., Pittsburgh.
James E. Murphy, Student, University of Pittsburgh, Pittsburgh.
Frank R. Turaj, Student, Bullard Havens Tech. School, Bridgeport, Conn.
Woodrow Wilson, Instr. & Fdy. Dept. Head, Bullard-Havens Tech. School, Bridgeport, Conn.

INTERNATIONAL

Australia

L. H. Ineson, Gen. Mgr., Hoskins Engineering & Foundry Ltd., Perth, W. Australia.

Belgium

Jacques De Vos, Tech. Engr., Societe Belge Griffin, Merksem-Lez-Anvers, Belgium.

France

Automobiles Peugeot, Bibliotheque, Paris.

Case Institute Students Awarded FEF Scholarships

Case Institute of Technology students were recently awarded Foundry Educational Foundation scholarships by Walter L. Seelbach, Superior Foundry, Inc., Cleveland, A.F.S. National Vice-Presidential Nominee and chairman of the Case Advisory Committee of FEF, at a ceremony held in the Case Student Union December 13. Standing, left to right: James J. Reymann, Alton W. Bardeen, Robert J. Unger, Peter J. Petto, Robert W. Lundberg, Frank C. Nelson, Daniel F. Mika, Patsy A. Santoli, Mr. Seelbach and George K. Dreher, executive director, Foundry Educational Foundation. Seated, left to right: Fred Karpoff, Jr., Ray H. Witt, John Varga, Jr., Frederick F. Awig, William L. Griffith, William Parana, Forrest Fisher, Henry Kopczewski. Not shown are Jerry Hix and Elliott Morris. The ceremony was held on Case Institute's campus.

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Hamilton, Ont.
Vice-Chairman
Ontario Chapter

Gordon McMillin
General Steel Castings Corp.
Granite City, Ill.
Director
St. Louis District Chapter

WHO'S WHO

H. H. Fairfield, co-author with James MacConachie of *"Evaluating Casting Finishes,"* Page 47, is chief metallurgist for Wm. Kennedy & Son, Owen Sound, Ont. . . . A graduate of the General Motors Institute of Technology, Flint, Mich., Mr. Fairfield was first employed by that company in its St. Catherine's, Ont., plant . . . Following six years as metallurgist for the Canadian Bureau of Mines, he joined the Harry W. Dietert Co., Detroit, as foundry consultant in 1946 . . . Since 1948 he has been with Kennedy & Son . . . He is a member of the A.F.S. Committees on Physical Properties of Iron Foundry Molding Materials and Non-Ferrous Sands at Elevated Temperatures and has written extensively on metallurgy and foundry practices for the trade and technical press.


H. H. Fairfield

Co-Author James MacConachie has been employed in the foundries of Wm. Kennedy & Sons at Owen Sound, Ont., for 29 years . . . Since 1941 he has supervised sand preparation and control for the company's iron, steel and bronze foundries . . . Mr. MacConachie was co-author of a 1949 A.F.S. Convention paper on *"Casting Surface Finish"* and recently served on the A.F.S. Ontario Chapter's "Panel of Experts."


J. MacConachie

Harry W. Dietert, author of *"Sheet Metal Forms Simplify Molding and Coremaking,"* Page 36, is author of the new A.F.S. publication, *Foundry Core Practices,* from which the article is excerpted . . . An A.F.S. Gold Medalist, Mr. Dietert has long been prominent in the A.F.S. Sand Division, where he has been chairman or a member of many of its committees . . . Mr. Dietert is well known to foundrymen for his frequent appearances as speaker at local, regional and national meetings of A.F.S. and for his many writings for the technical press . . . He is president of the Harry W. Dietert Co., Detroit foundry sand consultants and manufacturers of sand testing equipment.


H. W. Dietert

Edward J. McAfee, author of *"How to Use Phenolic Casting Resins for Pattern Coatings,"* Page 27, is master patternmaker at the Puget Sound Naval Shipyard, Bremerton, Wash. . . . Mr. McAfee, who was recently cited by the Navy for meritorious service, began as a patternmaker at Puget Sound Naval Shipyard in 1916, was made supervisor there in 1917 and master patternmaker in 1938 . . . Mr. McAfee, who has long been a leader in the development of new patternmaking practices, is co-author of the *Patternmakers' Manual,* published in 1947 by the Patternmakers' League of North America and has authored many articles on the subject for the trade and technical press . . . He has for many years served A.F.S. as a member of its Pattern Manual Committee and of the Apprentice Contest Committee and is a director and Apprentice Contest chairman for the Washington Chapter.


E. J. McAfee

R. A. Colton, author of *"Copper-Base Alloys Have Wide Range of Properties,"* Page 49, is in charge of research development of copper-base alloys for the Federated Metals Div., American Smelting & Refining Co. . . . Holder of a B.S. in metallurgy from the Carnegie Institute of Technology, Mr. Colton did graduate work there and later was employed by the Institute's Metals Research Laboratory . . . A member of the A.F.S. Committee for Revision of Recommended Practices, Mr. Colton visits foundries throughout the country regularly as part of his work for Federated Metals . . . He has written several articles and has spoken before many technical groups on metallurgy of copper-base alloys.


R. A. Colton

Malley J. Byrd, author of *"University of Alabama Foundry Has Top Facilities,"* Page 35, is a graduate student in journalism at the University of Alabama, where he does free-lance publicity work on the many phases of University life . . . He enlisted in the Navy at the age of 20 and served in North Africa and the United States in World War II . . . Upon discharge in 1947, he attended Mississippi Southern College, graduating with honors, and while there edited the college's student newspaper.


M. J. Byrd

David M. Zall, author of *"MnSi and FeSi Determinations in Manganese Bronze,"* Page 61, was born in Russia and came to this country shortly after World War I . . . He attended the National Preparatory School, Philadelphia, and Dickinson College prior to becoming control chemist for Pyrites Co., Wilmington, Del., in 1932 . . . Following five years of running his own business, Mr. Zall became a chemist for the U. S. Naval Experimental Station at Annapolis, Md., his present position there.


D. M. Zall

Theodore G. Kennard and John F. Drake, co-authors of *"Closed Top System in Cupola Stack Emission Control,"* Page 55, are partners in the firm of Kennard and Drake, Los Angeles, chemical engineers . . . Mr. Kennard holds a B.A. from Pomona College and a Ph.D. in chemistry from Cornell University, and from 1931 to 1942 was a research fellow at Claremont College . . . During the war he served as chief spectroscopist and assistant chief chemist for Kaiser, Inc.'s Iron and Steel Division, Fontana, Calif., and in 1944 went into partnership with Mr. Drake.


T. G. Kennard

Co-Author John F. Drake attended the Universities of Minnesota and Southern California . . . Following 10 years as chief chemist for Interlake Iron Corp., Duluth, Minn., he became chief chemist for Kaiser Steel Corp., Fontana, Calif., where he met his partner-to-be Theodore Kennard . . . Mr. Drake has spoken before meetings of several metals societies and has written articles on the cupola for the press.

J. F. Drake

BOOK REVIEWS

Metallography

The Principles of Metallographic Laboratory Practice, Third Edition, by George L. Kehl. 520 pp. Illustrated with charts, tables, drawings, photographs and photomicrographs. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 18. $5.50. (1949).

Thoroughly revised and rewritten to include latest developments in the field, the Third Edition, like its predecessors, presents the fundamentals of metallographic laboratory practice in a treatment bridging the gap between theory and practical application in the laboratory.

The author, George L. Kehl, associate professor of metallurgy, Columbia University, has added new photomicrographs and has expanded text material to include latest information on general metallographic laboratory practice, test procedures, techniques and equipment. New illustrations clarify the text.

Centrifugal Casting

Bibliography of Centrifugal Casting, compiled by H. F. Taylor and C. L. Register, 108 pp., 6x9. Published by American Foundrymen's Society, Chicago (1949). $1.50 per copy to A.F.S. members, $2.25 to non-members.

This bibliography was originally prepared and compiled during the war to assist the War Metallurgy Committee and the Navy Department in a proper assessment of the position of centrifugal casting with respect to other casting methods; also, to fulfill the need of engineers desiring to establish centrifugal casting facilities for published technical and patent information. It was compiled by Howard F. Taylor, Associate Professor, Department of Metallurgy, Massachusetts Institute of Technology and Charles L. Register, Lieutenant Colonel, Ordnance Dept., United States Army. In addition to listing over 300 articles on centrifugal casting arranged as to year of publication and over 500 patents, this bibliography has a brief history of the development of centrifugal casting, a discussion of fundamentals, a listing of 85 publications in which these bibliographic references appeared with names and locations of publishers.

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TEXAS CHAPTER *Secretary,* P. B. Croom, 5210 Canal, Houston, Texas

TIMBERLINE CHAPTER *Secretary,* James Schmuck, Rotary Steel Castings Co., 1425—5th St., Denver, Colorado

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WESTERN NEW YORK CHAPTER *Secretary,* R. E. Walsh, Hickman, Williams & Co., 32 Eastwood Place, Buffalo, N. Y.

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MICHIGAN STATE COLLEGE *Secretary-Treasurer,* Fred W. Schwier 8

UNIVERSITY OF MINNESOTA

MISSOURI SCHOOL OF MINES *Secretary,* Ralph E. Johnston

OHIO STATE UNIVERSITY *Secretary-Treasurer,* Charles J. Weiland

OREGON STATE COLLEGE *Secretary,* Leonard M. Preston

TEXAS A & M COLLEGE *Secretary,* R. L. Jones

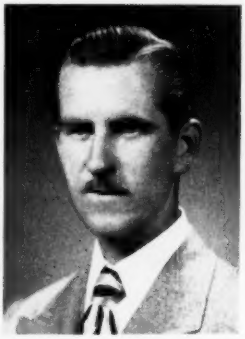
FOUNDRY *Personalities*

William C. George has been appointed sales engineer for the American Brake Shoe Co.'s Southwest territory and will be in charge of the company's new sales office at 2620 Maury St., Houston, Texas. Mr. George, who will represent Brake Shoe's American Manganese Steel, Electro-Alloys and National Bearing Divisions, has been with Brake Shoe since 1939 and is a chemical engineering graduate of Purdue University and was formerly with Carnegie-Illinois Steel Corp.

Reginald M. Littlejohn, formerly sales manager for Wm. R. Barnes Co., Ltd., Hamilton, Ont., was recently elected president of the Hamilton Facing Mill Co., Ltd., Hamilton.

Walter A. Kesterke has been named Wisconsin and southwest Michigan sales representative for United States Rubber Co.'s line of industrial grinding wheels. Mr. Kesterke has had more than 20 years experience in iron and steel foundries.


A. J. Herzig


Jack Richardson


H. H. Stephens

Alvin J. Herzig was recently elected president of the Climax Molybdenum Co. of Michigan, research subsidiary of the Climax Molybdenum Co. Mr. Herzig was chief metallurgist for Climax since 1931, when its research laboratory was opened. He holds B.S. and M.S.E. degrees from the University of Michigan.

Robert T. Pring has been appointed technical director of the Dust and Fume Division of the American Wheelabrator & Equipment Corp., Mishawaka, Ind. A graduate of the Harvard School of Public Health, Mr. Pring was formerly director of the Kennecott Copper Corp.'s Industrial Hygiene Dept.

Henry F. DeBardeleben was elected chairman of the Board of Directors and **Newton H. DeBardeleben** president of the company at a meeting of the DeBardeleben Coal Corp.'s Board of Directors December 2. The new president is a graduate of the University of North Carolina and the Yale Law School and practiced law in Birmingham for several years prior to serving with the Navy in World War II. Since the war he has served in all departments of the company. He is a grandson of pioneer coal and iron producer Henry R. DeBardeleben, founder of the company.

Jack Richardson, formerly with United Smelting & Refining Co., Hamilton, Ont., has been appointed sales manager for Wm. R. Barnes & Co., Ltd., Hamilton. He is a director of the A.F.S. Ontario Chapter.

Kurt A. Miericke has been appointed sales manager of the Bentonite department of the Baroid Sales Division of National Lead Co. Mr. Miericke will make his headquarters at 637 Railway Exchange Bldg., Chicago, but will carry out a sales program for National Bentonite throughout the country.

Dr. Robert F. Mehl of the Carnegie Institute of Technology has been appointed chairman of the Committee on Metallurgy of the Research and Development Board, National Military Establishment. Dr. Mehl will investigate the problem of coordinating all metallurgical research and development undertaken by technical agencies of U. S. Military Departments.

Harry Oldham has been named foundry superintendent of Hunt-Spiller Mfg. Corp., Boston. A native of England, where he served his foundry apprenticeship, Mr. Oldham held posts in the foundries of the Ford Motor Co. for 23 years and more recently was general foundry superintendent for Mack Mfg. Corp., New Brunswick, N. J. He will have direct supervision of Hunt-Spiller's production of gray iron, steel and non-ferrous castings.

Horace H. Shepherd, Birmingham, England, foundry consultant and for 23 years a member of the American Foundrymen's Society, has moved to St. Peter's, near Sydney, N. S. W., Australia, where he will install and operate a completely mechanized gray iron foundry for Lister, Blackstone Pty., Ltd., Australian subsidiary of R. A. Lister & Co., Gloucestershire, England. A graduate of Birmingham Technical College and a Fellow of England's Institute of Metallurgists, Mr. Shepherd was for 14 years a member of the British Cast Iron Research Association Council and served as chairman of that organization's Malleable Research Sub-Committee from 1936 to 1945. During World War II, Mr. Shepherd served as chairman of the IBF Advisory Committee on Foundry Technical Education to the Ipswich School of Engineering. He has taught foundry technology and metallurgy at Coventry Technical College and the British Foundry College, in addition to serving industry in executive foundry and metallurgical capacities for over 30 years.

J. G. Cametti has been named to construct precision casting facilities for production of turbine blades for jet engines at the Westinghouse Electric Corp.'s Aviation Gas Turbine Div., Kansas City, Mo. Mr. Cametti has been foreman of Westinghouse's Precision Casting Pilot Plant since its establishment in 1942.

G. R. Brophy, research metallurgist, has been named head of International Nickel Co.'s New England Technical Section,

Development and Research Div., Hartford, Conn. Formerly with the General Electric Research Laboratory, Schenectady. Mr. Brophy joined the International Nickel Co. in 1936.

Francis B. Foley, formerly of the Midvale Co., Philadelphia, has joined the staff of the Research Laboratory of the International Nickel Co. at Bayonne, N. J., as consulting metallurgist. Mr. Foley joined Midvale in 1926 in a research capacity and later became chief research engineer. He was president of the American Society for Metals in 1948 and is a director-elect of the American Institute of Mining and Metallurgical Engineers.

Herbert J. Cooper has been named assistant to the general manager of the Cooper Alloy Foundry Co., Hillside, N. J. Holder of B.S. and M.S. degrees from the Columbia University School of Metallurgy, Mr. Cooper was employed by the Bethlehem Steel Corp. prior to joining Cooper. Until

H. J. Cooper

his present appointment, Mr. Cooper has been engaged in practical research on the development of centrifugal casting and oxygen injection techniques at Cooper.

H. M. Rich, Jr., has been appointed general sales manager for the Electro Metallurgical Division of the Union Carbide and Carbon Corp., New York. Mr. Rich joined Electromet in 1942 after 10 years with Hickman, Williams & Co., Inc., in Detroit. From 1943 to 1948, Mr. Rich served as New York District manager of the Electro Metallurgical Sales Corp., and in 1948 he was appointed division manager of the New York and Birmingham territories. He will continue to make his headquarters in the company's general offices in New York.

G. R. Carrier of 1815 West 95th St., Chicago, has been named exclusive representative for Hydro-Line air and hydraulic cylinders in the Chicago and Northern Illinois territory.

Robert C. Johnston has joined the sales force of Hickman, Williams & Co., Inc., in Chicago. Since graduation from Cornell University in 1947 he has been employed in the Blast Furnace Dept. of the Carnegie Illinois Steel Corp.'s South Works.

Three new executive appointments announced recently by the Aluminum Co. of America, Cleveland, are: **Maurice W. Daugherty** to be secretary of the com-

M. W. Daugherty

A. M. Montgomery

W. E. Sicha

pany's Aluminum Research Laboratories at New Kensington, Pa.; **Walter E. Sicha** to succeed Mr. Daugherty as chief of the Cleveland Research Division; and **Alan M. Montgomery** to be assistant chief of the Research Division. Mr. Daugherty has been with Alcoa since 1923 and developed the company's Corrosion Laboratory. Mr. Sicha has been assistant chief of the Cleveland Research Division since 1948. He is chairman of the Aluminum & Magnesium Division of the American Foundrymen's Society and is Immediate Past Chairman of the A.F.S. Northeastern Ohio Chapter. Mr. Montgomery joined the Cleveland Research Division in 1939, becoming head of its Metallographic Group in 1940. He has developed many new metallographic techniques and practices for aluminum and magnesium casting alloys.

L. J. Buckley has been appointed manager of the newly-formed Accessories department of the Steel Sales Corp., Chicago.

George W. Zabel, formerly vice-president of the Bardes Forge & Foundry Co., has been named foundry consultant and sales engineer for William Lans Sons Co., South Beloit, Ill. Prior to attending the University of Kansas and Baker University and subsequently entering the foundry industry, Mr. Zabel was from 1911 to 1917 a professional baseball player with

G. W. Zabel

the Cheyenne, Kansas City, Los Angeles, Winnipeg, Louisville, Youngstown and Chicago Cubs baseball teams.

Paul L. McCulloch, Jr., formerly with the Rochester, N. Y., office of the American Brake Shoe Co., has been transferred to the company's Pittsburgh district sales office where he will serve as sales engineer for the company's American Manganese Steel and Electro-Alloys Divisions. Mr. McCulloch, who attended Columbia and Temple Universities served as a First Lieutenant with the Army in Europe during World War II. He replaces **M. A. Zeller,** who recently resigned.

Thomas C. Weiser has been appointed assistant operating manager of the Griffin Wheel Co., Chicago, where he has served as head of the company's Foundry Division since 1946. Mr. Weiser has been with Griffin Wheel since 1906, when he joined the company as a clerk. During his career with Griffin Wheel, Mr. Weiser has been superintendent of the Boston, Mass., and Council Bluffs, Iowa, plants.

Joseph Farley has been named special sales representative for the Gray Iron Foundry Division of the Dexter Co., Fair-

(Continued on Page 88)

Heading various round table discussions on melting practice at the January 9 meeting of the Metropolitan Chapter were, left to right: C. L. Lane, Florence Pipe Foundry & Machine Co., Gray Iron; B. A. Miller, Baldwin Locomotive Works, George Bradshaw, Philadelphia Navy Yard, and E. Miller, Bethlehem Steel Foundry, Brass and Bronze; and Carl J. Jernstrom, Cooper Alloy Foundry Co., Steel leader.

CHAPTER ACTIVITIES NEWS

Highlights of Central Michigan Chapter's Annual Christmas Party caught by Photographer J. T. Ehman of the Albion Malleable Iron Co., Albion, Mich., included a photograph of Prof. C. C. Sigerfoos, Michigan State College (upper left) admiring one of two cupolas serving as beverage dispensers, and (lower right) one of 96-year-old retired foundryman John Menne and lady guest. Mr. Mennes was guest of honor at the party.

Mo-Kan

Thomas F. Shadwick
Witte Engine Works
Chapter Reporter

DESPITE ZERO WEATHER, a large number of members turned out for the first meeting of 1950, held January 3 at the Fairfax Municipal Airport, Kansas City, Mo., and featuring a Naval Research Bureau film on gating of steel castings. There was no technical speaker for the meeting.

Opening the meeting, J. T. Westwood, Blue Valley Foundry Co., Kansas City, Mo., Chapter Chairman, commented on the success of the Chapter's Dinner Dance and complimented members and their companies on their support. Mr. Westwood announced that proceeds of the dance would enable the Chapter to purchase a film projector for its meetings.

The colored sound film dealt with proper and improper methods of gating steel castings. Methods of finger gating, gating through risers, horn and step gates were shown. In the film, hot steel was poured in open molds without copes, so that the effect of molten metal entering through the gates into the mold cavity could better be studied and observed.

In the business meeting following the film it was decided that all future meetings of the chapter be held at Fairfax Municipal Airport Bldg. on the first Wednesday of each month.

The following guests and prospec-

tive members were present at the meeting: W. A. Collins, Superior Aluminum Foundry, Independence, Mo.; Charles Austin, National Brass Foundry, Independence, Mo.; Wilford Monosmith, Blue Valley Foundry Co., Kansas City, Mo.; R. S. White, American Brake Shoe Co., North Kansas City, Mo., and Emmett White, Blue Valley Foundry Co.

Several prominent New England foundrymen attended the November meeting of the Massachusetts Institute of Technology Student Chapter. At extreme right is George K. Dreher, Foundry Educational Foundation, speaker.

Oregon State College

Donald Brown
Chapter Reporter

THIS YEAR the Oregon State College Student Chapter is planning a dinner meeting each term featuring a prominent speaker. The first of such meetings was held December 1 at the Memorial Union Tea Room, with R. S. Grundy, head of the foundry section of the United States Bureau of Mines, Albany, Ore., speaking on the induction furnace and the metal zirconium.

Other plans for the coming term include a field trip to foundries in the Portland area, and establishment of a graduate correspondence system whereby graduates write back to the student chapter on their experiences in the foundry industry and suggest how the chapter can be improved to prepare men for the foundry industry.

Western Michigan

Francis W. Beetham
Campbell, Wyant & Cannoun Foundry Co.
Publicity Chairman

A DOUBLE-FEATURE program was put on by Charles R. Foster, Eastman Kodak Co., Rochester, N. Y., at the January 9 meeting. Mr. Foster opened his program with a talk on "*Color Photography and Polarized Light in Metallography*," then showed some of his hobby color films of flowers and reptiles in Florida.

Mr. Foster gave detailed data on the use of color emulsions in the analysis of metal structures and effectively showed differences in rendition by conventional black and white photography contrasted with that obtained by color emulsions.

Mr. Foster's colored slides of Florida revealed a "master's touch" in handling of subject, composition and technical requirements.

A short directors' meeting was held in which it was decided that the Summer Outing will be held August 19.

Central Illinois

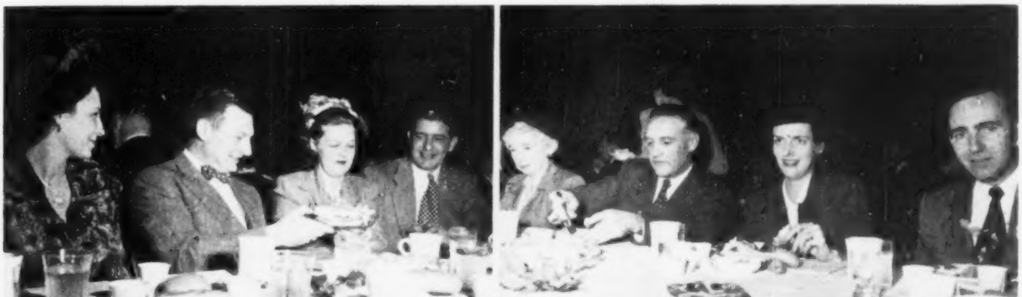
John R. Nieman
Caterpillar Tractor Co.
Chapter Reporter

JANUARY 9 DINNER meeting featured a talk by Charles B. Schureman, Baroid Sales Div., National Lead Co. on "*Foundry Sands*." The meeting was held at the Jefferson Hotel, Peoria.

"The study of foundry sands is not an exact science. Founding is an art. With all possible variables removed, we still experience surprises," were his opening statements.

For these reasons Mr. Schureman emphasized that sand handling systems should be designed by people who know sands. He pointed out that short cuts and cost cuts invariably demand its sacrifice in capacity, flexibility or accuracy of control, any one of which will shortly take its toll in casting losses, in excess of the original and operational economy.

"When adequate systems are installed and proper sand mixtures have been proven, rigid controls must be continually exercised. Measuring devices must be checked frequently for accuracy. Proper sequences of mixes should be established and adhered to. Mixing time should be established and adhered to. Mixing personnel should be selected with care, and carefully trained on the requirements of their



Doing justice to the excellent turkey dinner served at the A.F.S. Central Illinois Chapter's Fourth Annual Christmas Party, held December 10 in Peoria, Ill., were, left to right: Mr. and Mrs. L. D. Harkrider of General Malleable Corp., Waukesha, Wis., and Mr. and Mrs. C. W. Russell, Mr. and Mrs. Burton L. Bevis, and Mr. and Mrs. J. L. Neiman, all representing the Caterpillar Tractor Co., Peoria, Ill.

job. Any changes necessary in mixes should be recorded, and all concerned be informed," he stated.

Mr. Schureman said that the phrase "nothing has been changed" is used all too often at times when casting defects are being traced. He said "this cannot be true when today we are getting bad castings, while yesterday we got good ones." He added that because of lack of control changes occur without anyone's knowledge.

In answering questions, Mr. Schureman stated that the coarsest constituent of a sand mix determines the casting finish. He recommends that core sands be selected to harmonize with molding sands. Other questions asked led into a discussion of problems related to sand expansion, and hot sand.

A film on the use of foundry chaplets was shown through courtesy of the Fanner Manufacturing Co.

Dr. H. K. Salzberg, Chemical Div., Borden Co., Bainbridge, N. Y., speaking at the January 13 meeting of Eastern Canada Chapter.

FUTURE CHAPTER

• FEBRUARY 15
CENTRAL MICHIGAN
Battle Creek, Mich.
H. E. Elliot
Dow Chemical Co.
"Effect of Gating & Risering Design"

• FEBRUARY 16
DETROIT
Harry J. Jacobson
Industrial Pattern Works
"Core Blowing"
L. D. Pridmore
International Molding Machine Co.
"Mold Blowing"

• FEBRUARY 17
TEXAS
Texas State Hotel, Houston
W. E. George
Booz, Allen & Hamilton
"Assured Profits for Your Business"

TRI-STATE
Tulsa, Okla.
J. A. Bowers
American Cast Iron Pipe Co.
"General Steel Foundry Practice"

• FEBRUARY 18
CHICAGO
Palmer House
Ladies Night

• FEBRUARY 20
QUAD CITY
Ft. Armstrong Hotel, Rock Island, Ill.
B. C. Yearly
National Malleable & Steel Castings Co.
"Malleable Gating and Feeding"

• FEBRUARY 24
CHESAPEAKE
Engineers' Club, Baltimore
Raymond C. Huntoon
Pressure Match Plate Co., Inc.
"Pressure Cast Aluminum Pattern Equipment"

ONTARIO
Royal York Hotel, Toronto
Group Meetings

• FEBRUARY 27
NORTHWESTERN PENNSYLVANIA
Moose Club, Erie
W. B. McFerrin
Electro Metallurgical Div., Union Carbide & Carbon Corp.
"Gray Iron Casting Defects"

• MARCH 1
TOLEDO
Toledo Yacht Club
Speaker to be announced.
"Customer Requirements"

• MARCH 2
CANTON DISTRICT
University Club, Akron
Norman A. Birch
American Brake Shoe Co.
"Gating and Risering"

• MARCH 6
CENTRAL INDIANA
Athenaeum, Indianapolis
F. E. Braun
Central Foundry Div., GMC
"Time Study & Methods"

Rochester

Donald E. Webster
American Laundry Machine Co.
Chapter Reporter

January 10 meeting, held at the Hotel Seneca, featured William M. Ball, Jr., R. Lavin & Sons, Inc., Chicago, as speaker.

Speaking on *"Effective Essentials Required in Making Non-Ferrous Castings,"* Mr. Ball stated that non-ferrous alloys have grown in number in recent years and each presents its own peculiar problems of gating, risering, feeding and shrinkage. Many of these problems must be considered in designing castings, and require the closest of cooperation between the designer and the foundryman Mr. Ball said, adding that the foundryman must be prepared and equipped to meet these problems through proper lay-out, melting practice, and molding, in order to produce sound castings.

Mr. Ball cited the need for good relations between management and labor in the building of a successful business. Of equal importance, he concluded, is the need for education and training of foundry personnel not only for production of castings but as future supervisory material.

Saginaw Valley

Kenneth H. Priestley
Vassar Electroloy Products
Chapter Reporter

Some 200 members and their guests gathered at the Fischer Hotel, Frankenmuth, Mich., for the chapter's January 5 meeting.

Special attraction for "coffee time" was a sound film, *"Fishing in Alaska."*

Speaker of the evening was Harry W. Dietert, Harry W. Dietert Co., Detroit, whose topic was *"Application of Sands in the Core Room."* Using colored motion pictures and slides, Mr. Dietert discussed the benefits of laboratory testing for the improvement of cores. Following Mr. Dietert's talk, Technical Chairman Roy Foster, Bay City Foundry Co., Bay City, Mich., lead an interesting and profitable discussion period on foundry sands.

Quad City

R. E. Miller
John Deere Planter Works
Publicity Chairman

A scientific approach toward foundry problems was presented by Thomas Muff, Sorbo-Mat Process Engineers, St. Louis, speaking at the January meeting on *"Gates and Risers."*

Sand, iron, design, cores and molding practice can all cause shrinks, Mr. Muff stated in his opening remarks. Sand with low hot strength or molds rammed soft both tend to increase shrinkage, while improper design cre-

MEETING PROGRAMS

● MARCH 6 (cont'd)

CENTRAL ILLINOIS
Jefferson Hotel, Peoria
T. W. Curry
Lynchburg Foundry Co.
"Application of Synthetic Resins as Core Binders"

METROPOLITAN
Essex House, Newark, N. J.
Speaker to be announced.
"Spheroidal Carbon Iron"

CHICAGO
Chicago Bar Association
Round Table Meetings

WESTERN MICHIGAN
Cottage Inn, Muskegon
J. A. Ridderhoff
Frederic B. Stevens, Inc.
"Core and Mold Coatings"

● MARCH 9

ST. LOUIS DISTRICT
York Hotel, St. Louis
Frank G. Steinebach
Penton Publishing Co.
"What Does the Foundry Industry Need?"

● MARCH 10

PHILADELPHIA
Engineers' Club, Philadelphia
Non-Technical Night

SOUTHERN CALIFORNIA
Rodger Young Auditorium, Los Angeles
Film: *"Behavior of Molding Sands at Elevated Temperatures"*
"Non-Ferrous Castings"
Speaker to be announced.

EASTERN CANADA
Mount Royal Hotel, Montreal
Technical Papers Competition

● MARCH 13, 14, 15, 16

SOUTHERN CALIFORNIA
Rodger Young Auditorium, Los Angeles
Harry W. Dietert
Harry W. Dietert Co.
Lecture series: *"Sand Control"*

● MARCH 14

N. ILLINOIS-S. WISCONSIN
Faust Hotel, Rockford, Ill.
Joseph Schumacher
Hill & Griffith Co.
"Sand Control in the Foundry"

ROCHESTER
Seneca Hotel, Rochester, N. Y.
T. E. Barlow
Eastern Clay Products, Inc.
"Cupola Refractory Practice"

● MARCH 17

TEXAS
Beaumont, Texas
Kurt A. Miericke
Baroid Sales Div., National Lead Co.
"Insulated Risers"

● MARCH 20

QUAD CITY
L. P. Robinson
Werner G. Smith Co.
"Cutting Core Room Costs"

● MARCH 24

CHESAPEAKE
Engineers' Club, Baltimore
E. C. Troy
Foundry Consultant
"Steel"

ates hot spots, Mr. Muff said.

Mr. Muff said that solidification in a casting should progress from thin sections to thick and gating should be at the heavy section.

Riser size and weight can be computed through formulas developed, the speaker said. After the weight of the riser iron is calculated, the number of risers is determined and the size of each found. Mr. Muff mentioned that in most cases gating is through the riser. Spin gates are used with a drag bob to give an initial swirling action, he concluded.

After the meeting specific problems brought up by members were discussed. Problem castings produced by Quad City Chapter foundries were displayed for suggestions on gating.

Also along scientific lines was the coffee talk, extremely interesting and informative, on the solar system given by Carl Gamble, an amateur astronomer from the Quad City area.

Chesapeake

Jack H. Schaum
National Bureau of Standards
Chapter Reporter

Third annual Oyster Roast took the place of the chapter's December meeting, in keeping with the prevailing holiday spirit. About 300 foundrymen celebrated the gala occasion at the Alcazar Hotel, Baltimore. Included on the menu were raw oysters and clams, oyster stew, oyster fritters, fried oysters, roast beef, steamed frankfurters in sauerkraut, and beverages.

Tri-State

Dale Hall
Oklahoma Steel Castings Co., Inc.
Publicity Chairman

December meeting was held at Hotel Alvin, Tulsa December 16. The speaker was William B. George, R. Lavin & Sons, Inc., Chicago. The subject: *"Metallurgy in the Brass Foundry."*

Mr. George covered the various steps necessary to produce quality non-ferrous materials. Drawings were used to illustrate the correct construction of a crucible furnace. Mr. George pointed out that if covers were replaced on the melting furnace as soon as the crucible was removed, cracking would be greatly reduced.

The speaker presented charts to be used as a guide in estimating foundry costs for small non-ferrous shops.

Southern California

W. G. Stenberg
U. S. Electrical Motors, Inc.
Publicity Chairman

January 13 meeting, held at the Rodger Young Auditorium, Los Angeles, had a large attendance including Jake Dee of Dee Brass Foundry, Houston; W. W. Kirby, representing A/S Bremanger, Kraftselskab, Bergen, Norway; and Charles W. Hauck of Detroit, retired, a member of the Saginaw Valley Chapter of A.F.S.

Talking foundry shop at a recent meeting of the Central Illinois Chapter were, left to right, Speaker Charles Schureman, Baroid Sales Div., National Lead Co.; Chapter Vice-Chairman W. G. Schuller, Caterpillar Tractor Co.; and Chairman Charles Bucklar, Superior Foundry Co. (Photograph courtesy of the Peoria (Ill.) Journal).

Speaking on *"What's Ahead in the Foundry Industry,"* Frank G. Steinebach, Penton Publishing Co., Cleveland, opened his talk by stating that the rain, cold and earthquake he experienced during his visit would have embarrassed the Chamber of Commerce.

The speaker pointed out that Washington had shown a partiality to steel over other metals during the war. Steps have since been taken by Washington


A F S
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to set up a Munitions Board with all types of metal represented. A Foundry Advisory Committee has been created and has West Coast representation from ferrous and non-ferrous foundries in order to get a well balanced picture of the industry.

Mr. Steinebach stated that the postwar period was the greatest period in our history due to progress made in modernization and mechanization. The educational program of the A.F.S. to get more college men into the foundry industry was cited for its progress.

Additional steps that we can take to further foundry progress were suggested by Mr. Steinebach. Some of these steps are: (1) better production and cost methods. (2) eliminate waste. (3) make the foundry a better place to work. (4) use technical research information. (5) increased active sales programs for the industry.

Mr. Steinebach concluded by stating that from present indications, 1950 should be a good year, especially the first six months.

Preceding the talk by our guest speaker, the films "*Atomic Bomb Test—Bikini Island*" and "*Operation Crossroads*" were shown. These pictures of the fourth and fifth atomic bombs were shown through the courtesy of the U. S. Navy.

Harry W. Dietert, Harry W. Dietert Co., Detroit, left, speaker at the January 5 meeting of the Saginaw Valley Chapter, relaxing with Technical Chairman Roy Foster, Bay City Foundry Co., Bay City, Mich., and Chapter Chairman Lyle L. Clark, Buick Motor Division, GMC, Flint, Mich.

M. I. T.

Richard A. Poirier
Technical Secretary

November meeting of the student chapter featured a talk by C. O. Bartlett of C. O. Bartlett & Snow Co., Cleveland, on "*Design, Construction and Operation of a Mechanized Gray Iron Foundry.*" The talk was preceded by dinner and a short business meeting of the chapter.

The purpose of Mr. Bartlett's talk was to acquaint future engineers with the problems of mechanizing a foundry. Using as an example the construction of a completely mechanized foundry in the South, Mr. Bartlett was able to completely discuss many of the problems and details that arise from designing, purchasing, and installation of molding equipment, sand handling equipment, conveyors, and cupolas and stone and coke hoppers. The main difficulty arose in estimating the size and cost of the different elements, the speaker said.

To further illustrate the modern trend in foundry mechanization, Mr. Bartlett showed slides on conveyors, sand systems, mullers, shakeouts, smoke hoods, pouring systems, dust collectors, and sand dryers.

After the question period, George K. Dreher, executive director, outlined the Foundry Educational Foundation's program, explained the type of worker in the foundry industry, and emphasized the need of future engineers to work during the summers.

This meeting was also attended by representatives of several foundries in the New England area.

On November 22, upon the invitation of the foundry superintendent, Mr. Stenberg, a group of students visited the Draper Corp. in Hopedale, Mass. Groups of three or four were escorted throughout the foundry, particular attention being given to questions about procedures and equipment. The visit concluded with an exhibition of the types of looms manufactured by the Draper Corp.

Eats were plentiful and good at Eastern New York Chapter's Second Annual Christmas Party, held at the Circle Inn, Lathams Corners, N. Y.

N. Illinois—S. Wisconsin

Jerry M. Zilka
Gunite Foundries Corp.
Chapter Technical Secretary

Regular monthly dinner meeting of the Chapter, held at the Hotel Faust, Rockford, Ill., January 10, featured as guest speaker Harry Jacobson, Industrial Pattern Works, Chicago, on "*Patterns and Coreboxes—the Key to Quality Castings.*"

In comparing the advancement and development of the foundry industry as against that of the "cold industries," the speaker concluded that the latter have shown great progress and technical development in recent years.

He mentioned the automatic screw industries as an illustration of the advancements that have been made by the cold industries. In recent years the foundry industry has also shown signs of advancing, Mr. Jacobson said.

In patternmaking, the speaker mentioned that some concerns are using

Speakers' table and part of the large crowd of foundrymen attending Wisconsin Chapter's Christmas Party December 9 at the Hotel Schroeder, Milwaukee. (Photo courtesy W. V. Napp, Badger Fire Brick & Supply Co.)

R. S. Grundy of the United States Bureau of Mines, Albany, Ore., speaker at Oregon State College Student Chapter's December 1 meeting, had an attentive audience in J. W. Smith, faculty advisor, and Harlin Hall.

Members of the Oregon State College Student Chapter photographed at a recent meeting are front row, left to right: D. Blair, E. Uebel, C. Utterback, Chapter President D. Swartz, L. Preston, J. Meece, E. Hawks. Back row, left to right: Faculty Advisor J. W. Smith, OSU Industrial Engineering Department, R. Knighton, D. Robertson, R. Duke, C. Coey, R. Coward, J. Croenig, C. Lauderdale, H. Hall, D. Crabtree and Loren Miller.

the specialist system in the development of patterns. Blueprints for patterns are being dimensioned in thousandths of an inch with shrinkage included, another indication of the trend toward specialization, he added.

Mr. Jacobson suggested that pattern dimensions be classed as functional dimensions and product dimensions. Product dimensions refer to all casting dimensions that are necessary to meet specifications. These are laid out by the design engineer. Functional dimensions refer to dimensions of all equipment and accessories needed to produce the casting such as core prints, crush strips, gates and runners, etc. These dimensions would be laid out by the pattern specialist, Mr. Jacobson said.

Thus, by having the dimensions established by the specialist in each category, it would be possible to produce castings that are accurate dimensionwise and at a reasonable cost, the speaker concluded.

It was announced that the chapter is sponsoring 13 entrants in the A.F.S. 1950 Apprentice Contest.

Special guests for the evening were L. C. Farquhar Sr., American Steel Foundries, East St. Louis, Ill., National Director of A.F.S., and Mr. Illineck, Instructor, Belvidere High School, Belvidere, Ill., together with several of his vocational students.

Eastern New York

George E. Danner
American Locomotive Co.
Publicity Chairman

Second Annual Christmas Party, held December 20 at the Circle Inn, Lathams, N. Y., started with a huge buffet supper and was followed by an entertaining floor show. A large number of members, guests and foundry suppliers attended the party, which was arranged by Jasper Wheeler, Wheeler Bros. Foundry, Troy, N. Y., program chairman.

Central Michigan

Frank P. Tobakos
Publicity Chairman

More than 100 members and guests attended the Annual Christmas Dinner Dance Party on December 10 at the American Legion Clubhouse, Battle Creek, Mich.

Preceding the turkey dinner was a social hour. Afterwards there was dancing to music of a local band. Souvenir compacts were presented to the ladies attending and sets of cards to the men. At intermission time a professional magician entertained.

Honored guest for the evening was John Menne, a 96-year-old retired foundryman. Mr. Menne, who was a prominent foundryman in the Central Michigan area for most of his career,

was given a year's membership in A.F.S. as a gift.

Those responsible for success of the party were Chapter Chairman Fitz Coghlin, Jr., Albion Malleable Iron Co.; Vice-Chairman George Petredean, Calhoun Foundry Co.; David Sherman, Engineering Castings, Inc., Chapter Secretary-Treasurer; and Chapter Director Jack Secor, Hill & Griffith Co., all of whom aided in arranging the program, decorations and sale of tickets.

Ohio State University

Dallas M. Marsh
Publicity Chairman

TWO FILMS, *"Step Gating"* and *"Finger Gating,"* produced by the Naval Research Laboratory, were shown at the January 10 meeting, held in the Ohio State University Industrial Engineering Building.

The first film concerned methods of step gating a vertically-cast ingot. Cross-sectional areas of sprues and gates were varied, the angles at which the gates entered the mold were changed, and the bottom ends of the sprues were widened or narrowed to provide a study of the effect of the different combinations on turbulence and successive feeding of the step gates.

A somewhat similar study of finger gating was shown in the second film. The films revealed that conventional methods of step gating and finger gating leave much to be desired concerning the controlled flow of metal.

Contributing to the discussion which followed were five guests from the Buckeye Steel Castings Co., Columbus, Ohio. The guests were: William Heimberger, works manager; Frank Hauck, superintendent; Harry Glen, chief inspector; Richard McClaine, core room foreman; and Sam Daugherty, open hearth supervisor.

New chapter members were introduced during the business session. The Ohio State University Chapter now has thirty-three members.

Keeping a sharp eye on proceedings at Wisconsin Chapter's Christmas Party were hard working Party Committeemen Harold Boehm, Allis-Chalmers Mfg. Co. (left) and Frank M. Jacobs, Standard Brass Works, Milwaukee.

Eastern Canada

A. J. Moore
Montreal Bronze, Ltd.
Publicity Chairman

FEATURED SPEAKER at the January 13 meeting, held at the Mount Royal Hotel, Montreal, was Dr. H. K. Salzberg, Chemical Div., Borden Co., Bainbridge, N. Y., who gave an interesting and informative talk on *"New Core Practices."*

Speaking on accomplishments which have brought the foundry industry to its present stage of development, Dr. Salzberg said that the first progress in the industry was made by individuals, but that recent developments in all phases of the industry are the result of teamwork.

Dr. Salzberg cited the use of phenolic resins in the core room, basing his talk on experimental work carried on in United States and Great Britain.

At the January meeting of the Quad City Chapter were, seated left to right: A.F.S. National Director Lloyd C. Farquhar, Sr., American Steel Foundries, East St. Louis, Ill., and Thomas Muff, Sorbo-Mat Process Engineers, St. Louis, speaker of the evening. Standing, left to right, Chapter Chairman Edward P. Closen, John Deere Planter Works, and Vice-Chairman Harold A. Rasmussen, General Pattern Corp., both of Moline, Ill.

Michiana

J. P. Jordan
Dodge Mfg. Corp.
Chapter Secretary

JANUARY MEETING of the chapter was held in the Bronzewood Room of the LaSalle Hotel, South Bend, Ind.

Obtained through the efforts of William F. Lange, Casting Service Corp., LaPorte, Ind., program chairman, and through courtesy of the Fanner Mfg. Co., two films were presented on *"Chaplets"* and *"Chills."* These films depicted applications of chaplets and chills in the production of castings by a number of leading foundries, and offered highly useful information on these subjects.

Twin City

O. J. Myers
Werner G. Smith Co.
Chapter Reporter

SPEAKING before a large group of members and friends of the chapter January 10 in Minneapolis, Bradley H. Booth, Carpenter Bros., Inc., Milwaukee discussed production and use of foundry sands, accompanying his

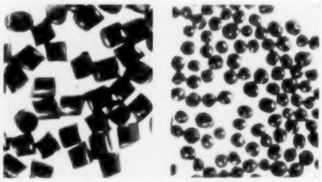
(Continued on Page 85)

NEW . . Foundry . Products

Readers interested in obtaining additional information on items described in New Foundry Products should send requests to Reader Service, American Foundryman, 222 W. Adams St., Chicago 6, Ill. Refer to the item by means of the convenient code numbers.

Chilled Iron Shot

FB1—Two new products, Five Star Malleabilized Shot and Grit, and Kut-Steel Shot, are announced by the Steelblast Abrasives Co. Five Star malleabilized shot and grit is designed for general abrasive blast cleaning and is claimed by manufacturer to outlast other types of abrasives



4 to 1. Kut-Steel shot has a Rockwell hardness of 46-52 and 270,000-300,000 psi tensile for shot peening. Claimed by manufacturer to outlast ordinary shot 20 to 30 times, Kut-Steel shot is shown at left in illustration as it is produced and at right as it is after some 1500 passes.

Fork Truck Dumping Equipment

FB2—Latest adaptation to its line of Worksaver battery-powered hand trucks is Yale & Towne's revolving fork carriage

for emptying scrap bins, dumping small parts from one bin to another, pouring ingredients into mixing or batching equipment and performing other dumping tasks. Bins used have short angle iron lugs welded to their sides to form a slot into which forks of truck fit. Slots permit Worksaver to lift bin to desired height and suspend it while revolving carriage rotates to dump the load. Non-tilting Worksaver is available in 1,000 and 1,500 lb capacities with wheelbase of 28¾ in., overall width of 32 in., overall height of 83 in., and 60 in. fork elevation.

Portable Pneumatic Vibrator

FB3—A new vibrator assembly incorporating cast steel male and female wedge-type mounting brackets for attachment to hopper railroad cars is announced by the Cleveland Vibrator Co. These new LSRR vibrators provide an intense vibration to speed the unloading of such materials as soda ash, coal, iron ore, carbon, lime and other bulk materials. In addition to unloading operations, LSRR vibrators are

recommended for use on other types of materials handling equipment, such as hoppers, bins, chutes and flasks. Vibrators are available in 3-in. piston diameter standard and 3-in. heavy duty, long-stroke sizes and can be moved from one installation to another to eliminate clogging and speed material flow. Speed of operation can be varied from 700 to 1100 vibrations per min for standard model and from 600 to 1000 vibrations per min for the heavy duty model.

Plastic Refractory

FB4—A slag-resistant plastic refractory, Narcoline, announced by the North American Refractories Co., is claimed to increase life of installations having slag erosion problems, such as ladle linings, spouts, breasts and wells of cupolas. Narcoline is shipped in 100 lb cartons and comes cut in 2 in. slices for ready installation and pounding into place with machinist's or small air hammer.

Lightweight Spectacles

FB5—Extremely light in weight, General Scientific Co.'s headrest spectacles are designed for operations where complete

eye coverage is unnecessary. Model LTB-50 spectacles can be comfortably worn over prescription glasses and are easily adjusted to any head. All-round ventilation prevents fogging. Available in 50 mm lenses, in shades No. 3 to No. 8.

Speed Desiccator

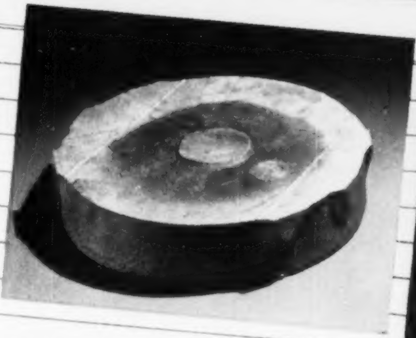
FB6—Harry W. Dietert Co.'s No. 5510 Speed Desiccator will rapidly cool any material faster than conventional glass desiccators because of its aluminum construc-

tion, manufacturer claims. Measuring 10½ in. diameter by 3¼ deep, the Speed Desiccator has ½ in. thick walls for greater thermal capacity. Silica gel desiccant is stored in 500 mesh wire cloth bottomed pan clipped inside cover, preventing loose gel and making it easier to renovate when

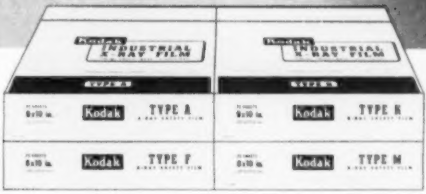
(Continued on Page 80)

What's the right X-Ray film?

Product:
Cast part for vital aircraft pump
Material:
Aluminum, $2\frac{1}{4}$" thick, $11\frac{1}{4}$" diameter
Equipment:
150kv x-ray unit



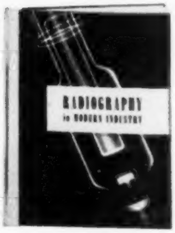
ANSWER:



KODAK INDUSTRIAL X-RAY FILM, TYPE A

With time, money and safety at stake, radiography was used to check this important casting for defects. With moderate kilovoltage to work with, and with aluminum as the material, the radiographer selected Kodak Industrial X-ray Film, Type A.

For with light alloys, this film has enough speed to keep exposures reasonably short even at low voltages. Its high contrast and fine graininess also permit taking full advantage of high kilovoltage machines in detecting irregularities in thick dense materials.



RADIOGRAPHY IN MODERN INDUSTRY

A wealth of invaluable data on radiographic principles, practice, and technics. Profusely illustrated with photographs, colorful drawings, diagrams, and charts. Get your copy from your local x-ray dealer—price, $3.

A TYPE OF FILM FOR EVERY PROBLEM

To provide the recording medium best suited to any combination of radiographic factors, Kodak produces four types of industrial x-ray film. They also provide the means to check welds efficiently and thus extend the use of the welding process.

Type A—has high contrast with time-saving speed for study of light alloys at low voltage and for examining heavy parts at 1000kv. Used direct or with lead-foil screens.

Type M—provides maximum radiographic sensitivity, under direct exposure or with lead-foil screens. It has extra-fine grain and, though speed is less than in Type A, it is adequate for light alloys at average kilovoltage and for much million-volt work.

Type F—provides the highest available speed and contrast when exposed with calcium tungstate intensifying screens. Has wide latitude with either x-rays or gamma rays, exposed directly or with lead screens.

Type K—has medium contrast with high speed. Designed for gamma ray and x-ray work where highest possible speed is needed at available kilovoltage without use of calcium tungstate screens.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography...

another important function of photography

Kodak
TRADE-MARK

NEW PRODUCTS

(Continued from Page 78)

moisture laden. Cover is easily removable because of check valve air inlet incorporated in cover. Window in cover permits observation of gel for removal or reconditioning when color turns to pink.

Bandsaw Tire

FB7—"Jifly Tire," a product of the Carter Products Co., is claimed by manufacturer to eliminate bandsaw tire problems. Made in sizes to fit any bandsaw

wheel, "Jiffy Tire" is easily affixed to wheel in five minutes without use of cement, glue, rims, bolts or special tools. Made of molded tread rubber, "Jiffy-Tire" has a crowned face to give tension on blade and is claimed to outwear other bandsaw tires by two or three times.

Single Plunger Valves

FB8—A new line of low-priced, double-piloted single plunger valves is announced by C. B. Hunt & Son, Inc. Carefully balanced, valves will remain in position until changed. Pilot cylinder can be operated at pressures as low as 25 psi, permitting use of valves at most instrument pressures. Valves consist of aluminum housing, hollow stainless steel plunger with precision-placed ports, and stainless steel pilot pistons mounted in brass pilot cylinders. Valves are furnished tapped for either 1/8 or 1/4 in. pipe connection, in 2-way, 3-way, double 2-way, 4-way and 5-way designs for use with air, oil or water at line pressures up to 125 psi maximum at normal temperatures.

Carbide and Abrasive Tools

FB9—Designed to operate at 38,000 rpm for operation requiring precise control, the Roto-Master high speed grinder, manufactured by the Metal Removal Co., will remove metal at high speed while giving full control. Grinder has carbide burrs which manufacturer claims actually shave metal, require practically no pressure, and give longer tool life as a result of light chip tooth load. Grinder will operate continuously for hours without heating if properly used, weighs only 13 oz. and operates on any 110-130 d.c. current. Dynamically balanced, grinder assures minimum of vibration, and finger tip pressure operates chucking mechanism for interchangeability of tools.

Plastic Resins

FB10—Two new products announced by E. F. Boruski, Jr., manufacturers' representative, are Elastomer 70, a plastic resin in non-volatile liquid form, and Elastomer 275, a plastic resin in "plastisol" form, i.e., vinyl chloride powder dispersed in a liquid plasticizer to make it pourable. Both products are designed to make or reproduce models and patterns used in sand casting. Elastomer 70 has good dimensional stability and 300 F heat resistance and can be used for cold setting impression molds without damaging delicate models, as a substitute for vulcanized rubber in situations where heat and pressure cannot be tolerated in curing cycle, or as a flexible master model for reproducing plaster molds used in precision casting. Elastomer 275 can be used for casting plaster, wax or resins, molds, models, liners and inserts. Waterproof and greaseproof, Elastomer 275 will reproduce model detail and surface texture exactly and is heat resistant to 300 F.

Portable Ventilators

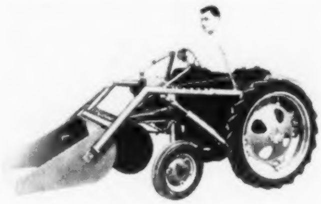
FB11—Portable ventilators developed by the Mine Safety Appliances Co. make work in noxious atmospheres safer and more comfortable by providing both ventilating and cooling air. Compact and lightweight, these ventilators can be moved from place to place on the job. Air is conveyed to desired point through 14 in. diameter, 16 ft long canvas duct treated for flame and mildew resistance, which can be collapsed and folded into compact bundle. Two-way air flow permits duct to be connected either to inlet or discharge side of fan. Up to 32 ft of duct may be connected on belt drive models to either side of fan. Ventilators may also be connected in series, reducing power requirements.

Foundry Ceramics

FB12—Laboratory Equipment Corp. announces the availability of ceramic tubes, crucibles and other shapes in magnesia, beryllia, zirconia, thoria and recrystallized alumina. These materials are available for various special applications (up to 3000 C or 5400 F) where commonly available ceramics will not stand up.

Loader and Stacker

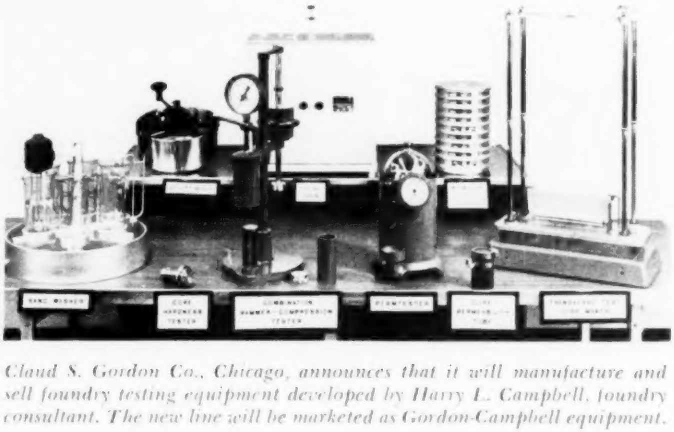
FB13—Two materials handling devices announced by the Maquoketa Co. are an economical loader and a fork and stacker. Hydraulically controlled, the loader has bucket which can be raised lowered or tripped from any position and has con-



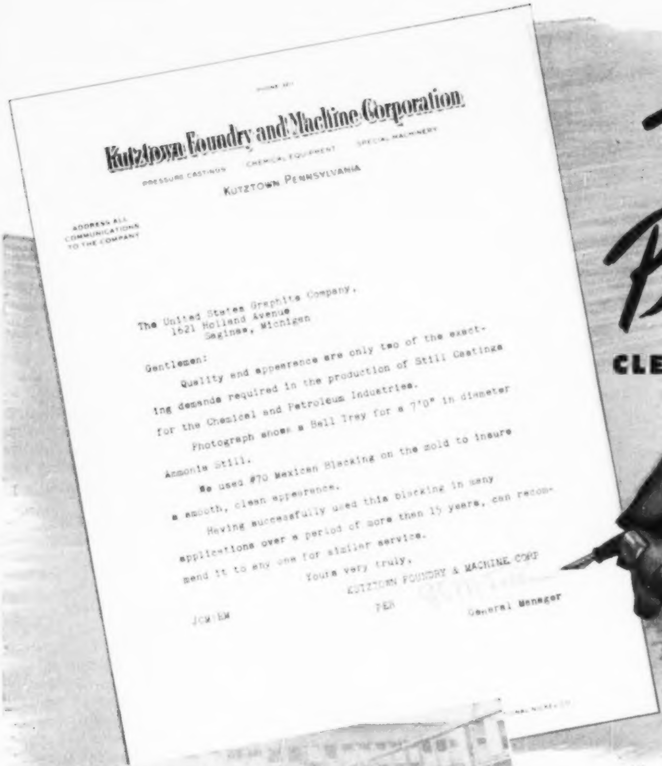
tinuously running pump operated from crankshaft. Will handle all types of bulk materials and aggregates. Short-turning fork and stacker lifts 1,000 lb, and has lift height and fork built to specifications. Fork and track tilt forward for loading and unloading and tilt back for stability when lifting or traveling with load. Hydraulic pump is operated from motor crankshaft. Both machines have turning radius of 63 in., 9.04 hp, and a four-cylinder, L-head Continental engine.

Gas Temperature Indicator

FB14—Development of a new remote reading ultra high gas temperature indicator is announced by Fairchild Camera and Instrument Corp. Designated Model 263, this instrument provides a convenient and extremely accurate method for measuring gas temperatures up to 5000 F, according to the manufacturer.



Claud S. Gordon Co., Chicago, announces that it will manufacture and sell foundry testing equipment developed by Harry L. Campbell, foundry consultant. The new line will be marketed as Gordon-Campbell equipment.


Kutztown Foundry and Machine Corporation

PRESSURE CASTINGS · CHEMICAL EQUIPMENT · SPECIAL MACHINERY

KUTZTOWN PENNSYLVANIA

ADDRESS ALL COMMUNICATIONS TO THE COMPANY

The United States Graphite Company,
1621 Holland Avenue
Saginaw, Michigan

Gentlemen:

Quality and appearance are only two of the exacting demands required in the production of Still Castings for the Chemical and Petroleum Industries.

Photograph shows a Bell Tray for a 7'0" in diameter Ammonia Still.

We used #70 Mexican Blacking on the mold to insure a smooth, clean appearance.

Having successfully used this blacking in many applications over a period of more than 15 years, can recommend it to any one for similar service.

Yours very truly,

KUTZTOWN FOUNDRY & MACHINE CORP

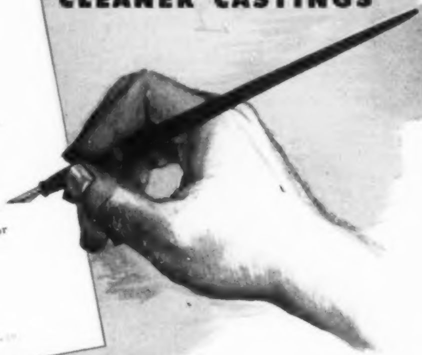
PER

General Manager

JCM:EM

No. 70 Blacking

FOR SMOOTHER CLEANER CASTINGS



The smooth surfaces of this bell tray for a 7′ diameter ammonia still, just one of a wide variety of castings produced by the Kutztown Foundry and Machine Corp. for the chemical and petroleum industries, require only a minimum of cleaning—thanks to No. 70 Blacking. No wonder Kutztown writes, recommending the use of No. 70 Blacking. This versatile mold coating penetrates deeply into sand surfaces to form a hard coat which turns out smoother, cleaner castings. It is economical and easy to use. No. 70 can be sifted dry through a cloth bag in treating green sand molds, for it draws sufficient moisture to bond to the sand; or it can be mixed with water to make an excellent wet blacking which assures a hard coat with maximum sand penetration for light and medium weight dry sand, skin dried and loam molds. It is also used by many production foundries to dip small baked cores which need extra protection under intense metal conditions.

- No. 70 Blacking, used by Kutztown in many applications for 15 years and preferred as a general purpose blacking by many other leading foundries, will help you to produce cleaner castings with less trouble and expense. Write for complete particulars.

THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHIGAN

DIVISION OF THE WICKES CORPORATION

FOUNDRY *Literature*

Readers interested in obtaining additional information on items described in Foundry Literature should send requests to Reader Service, American Foundryman, 222 W. Adams St., Chicago 6, Ill. Refer to the items by means of the convenient code numbers.

Crucible Melters' Handbook

FB101—Fourth Edition of the *Crucible Melters' Handbook,* published by the Crucible Manufacturers' Association is available free-of-charge to readers of AMERICAN FOUNDRYMAN. A treatise on crucible furnaces and the storing, handling and use of crucibles, the 16-page, pocket-sized handbood contains many photographs of crucible melting installations and charts showing metal points, standard crucible sizes and typical non-ferrous alloys. Text covers descriptions of various types of crucible furnaces, fuels; storage, handling and use of crucibles and crucible equipment in the foundry.

Stainless Alloy

FB102—Cooper Alloy Foundry Co. announces publication of a new bulletin, "*Molybdenum-Bearing Stainless Casting Alloy Has Wide Range of Uses,*" a four-page folder designed to present complete data covering properties and uses of CF-8M, a casting alloy similar to 316 Stainless. This molybdenum-bearing alloy has good corrosion resistance, as well as increased strength at elevated temperatures. Copies available free upon request.

Graphite Products

FB103—Two bulletins available from the United States Graphite Co. describe Mexite Briquettes and No. 8 Mexican Graphite. Mexite Briquettes, designed for carbon control in the cupola, replace carbon usually provided by pig iron, supply a uniform steady source of graphitic carbon, enable better castings to be poured from 100 per cent scrap charges and raise carbon to reduce chill, shrinkage and hardness. No. 8 Mexican Graphite, for ladle recarburization of steel, is claimed by manufacturer to give consistent, efficient recovery, improve rimming quality, reduce "off" carbon heats, and to cause no ladle reactions. Applications of each product are listed in detail.

Bronze and Copper

FB104—A new 29-page, illustrated catalog released by National Bearing Div., American Brake Shoe Co., gives physical properties and comparative specifications for 27 different bronze alloys and five aluminum manganese bronzes, and contains an outline of the applications of bronze. Sizes and weights of rough and machined bronze bars are tabulated. Babbitt metals, their descriptions and uses, are also discussed and illustrated and their various physical properties charted. The booklet also describes National Bearing Div.'s complete manufacturing facilities for non-ferrous bearings and castings.

Industrial Ventilation

FB105—An illustrated brochure published by Dravo Corp. describes means by which air exhausted from industrial structures can be replaced. Subjects covered in the folder are amount of heat necessary, higher equipment efficiency, partial ventilation and practical requirements. Also described is the Dravo line of Counterflo warm air space heaters.

Products and Processes

FB106—A booklet newly published by the Union Carbide & Carbon Corp. describes principal activities of Union Carbide's five major corporation groups—Alloys and Metals; Chemicals; Electrodes, Carbons and Batteries; Industrial Gases and Carbide; and Plastics. Short historical sketches trace the early years of some of Union Carbide's predecessor companies.

Coolant Base

FB107—Swan-Finch Oil Corp.'s new pocket-size illustrated folder describes applications of Safco 770, an all-purpose coolant base and its advantages in grinding and machining of castings. Several instances of Safco 770's performance in foundries are cited and a recommended dilution chart is included in booklet.

Cupola Data

FB108—Two information circulars written by Foundry Consultant G. C. Creusere are available from the Ironton Fire Brick Co. Circular 28 deals with useful information on cupola repair, and Circular 29 describes methods of simplified cupola operation and contains a time schedule for preparing a cupola for heat.

Magnetic Crane Control

FB109—Whiting Corp.'s simplified system for magnetic crane control is discussed in a four-page bulletin newly released by that organization. This method of control employs small master switches and solenoid starters instead of drum controllers or conventional magnetic controls. The Whiting system correlates masters, solenoid contactors and a fool-proof electrical circuit into an operational plan that protects load and crane under all possible foundry conditions.

Electric Furnace Process

FB110—Superior Foundry, Inc.'s electric furnace process for making alloyed gray iron castings is described in detail in an eight-page folder. Advantages of this process and metallurgical control systems employed are described in detail. Tables give analyses and mechanical properties of several types of gray iron produced, minimum physical properties and tabulated results of various types of test bars.

Core Room Dermatitis

FB111—Although cases of dermatitis resulting from plastic resin binders are rare, Borden Co.'s Chemical Division has published a bulletin, "Plastic Core Binders and Workers Health," describing simple preventive measures that will eliminate even these isolated instances. Described are component chemicals that in poorly ventilated working areas may cause discomfort to the worker, together with several simple directions for prevention of such discomfort should it occur. The bulletin is compiled from data obtained from resin chemical manufacturers.

Mill Rolls

FB112—A 20-page booklet describing manufacturing processes required to produce a cast steel or cast iron roll used in forming of steel, iron, glass, aluminum or plastics (See "*Modern Foundry Methods,*" Pages 42-45, this issue) is available from the Mackintosh-Hemphill Co. "*How Rolls Are Made*" features 22 pictures taken during normal operations in the company's Pittsburgh and Midland, Pa., plants. Described are mold types, use of open hearth and air furnaces, tapping, pouring, annealing and roll finishing processes for making steel and iron rolls.

CHAPTER ACTIVITIES

(Continued from Page 77)

talk with a series of Kodachrome slides.

Beginning with a brief history of the use of sand in the foundry, Mr. Booth then divided foundry sands into five classes—(1) Silica, (2) Dune, (3) Bank, (4) Molding, and (5) Miscellaneous (Olivine, Zirconite, etc.).

The speaker described core and molding sand deposits found in the United States and made comparisons of the sands found in the various areas.

Mr. Booth concluded his talk by stating that Albany sands are still in good potential supply, but good grades are becoming increasingly difficult to procure because the most accessible deposits have already been worked.

Central Indiana

Wm. K. Mitchell
L. W. and W. K. Mitchell
Chapter Reporter

SPEAKING BEFORE an appreciative audience of more than 115 members, Robert P. Schauss, Illinois Clay Products Co., Chicago, delivered an address on "*Gating and Risering*" at the January 9 meeting, held at the Athenaeum, Indianapolis.

Mr. Schauss emphasized the importance of correct risers in all types of casting. He suggested that to obtain peak efficiency in pouring it is important that hot metal get into all the feeders and risers.

Mr. Schauss expressed the opinion that open feeders are not particularly efficient in comparison with closed feeders. The important point is the connection between the feeder and the casting cavity, he said. He enlarged on this subject by explaining the principal of the "Williams Riser," which he said is a great aid in helping keep the feeder opening open. The talk was illustrated with lantern slides, and closed by a question and answer session.

Edward Stahr, National Malleable & Steel Castings Co., Indianapolis, served as technical chairman for the meeting and moderator of the question and answer session.

Northwestern Pennsylvania

Earl M. Strick
Erie Malleable Iron Co.
Chapter Secretary

LARGEST CHRISTMAS PARTY in the history of the Chapter was held at the Saga Club, Erie, December 16 and attended by 225 members and guests.

Following dinner, Chairman Joseph A. Shuffstall, National-Erie Corp., introduced various guests and congratulated the Party Committee on its work in making the affair a success. Committee members were Charles Gott-

Charles S. Foster, Eastman Kodak Co., Rochester, N. Y., speaker on polarized light and color photography in metallography at the January 9 meeting of the Western Michigan Chapter, Muskegon.

schalk, and Courtney Wilcox, Cascade Foundry; and Dewey Davis, Urick Foundry Co.

Chapter Chairman Frank Volgstadt presented past chapter chairmen with buttons and thanked each for their contributions to the chapter.

Following this, nearly 50 Christmas presents were given out preceding a professional floor show. Afterwards a social hour climaxed the party.

Metropolitan

Carl Szego
Moldcast Products, Inc.
Publicity Chairman

ANNUAL CHRISTMAS PARTY was held at the Essex House, Newark, N. J. on December 9 and was attended by approximately 450 members and guests.

The party was planned by a committee headed by B. E. Beldin, Whitehead Bros. Co., and consisting of D. S. Yeomans, Geo. F. Pettinos, Inc.; T. J. Wood, American Brake Shoe Co.; Arthur L. Fischer, Fischer Casting Co.; D. Polderman, Jr., Whiting Corp.; William Lawson, Springfield Facing Co.; J. F. Bauer, Hickman, Williams & Co., Inc.; H. A. Robinson, Republic Steel Corp.; and F. B. Eliason, Pennsylvania Foundry Supply & Sand Co.

Cincinnati District

J. T. Kahles
University of Cincinnati
Chapter Research

JANUARY 9 MEETING, held at the Engineering Society Bldg., Cincinnati, featured a talk and showing of films on motion study by Elmer F. Braun and S. D. Martin of Central Foundry Div., GMC, Danville, Ill.

Mr. Braun spoke on use of motion studies to increase production in the foundry. In many cases, he said, only minor changes in the arrangement of

equipment and tools may minimize the amount of workers' motion.

Mr. Martin demonstrated how a few changes in a molding bench can decrease time required for production of cores. Following his talk, a motion picture was shown illustrating some revisions made at GMC's Saginaw Malleable Iron Plant as a result of time and motion studies.

Philadelphia
A. J. Saute
Publicity Chairman

January 13 meeting of the chapter, held at the Engineers' Club and attended by 150 members, featured a film on *"Chaplets"* and a talk by Norman A. Birch, National Bearing Div., American Brake Shoe Co.

Mr. Birch's talk dealt with risers, their functions and various ways in which foundrymen can improve their effectiveness. He explained controlled directional solidification applications, the use of chills and the functions of neck-down cores, insulating material, heat generating compounds and exothermic core materials.

A welcome visitor at the meeting was A.F.S. National Director Fred G. Sefing, International Nickel Co.

AMERICAN FOUNDRYMAN Available on Microfilm

Microfilmed copies of American Foundryman are now available to libraries and other interested organizations faced with the problem of storing large numbers of technical periodicals.

Under a new microfilming plan, an entire volume of the magazine can be kept on a single roll of film, effecting a great saving in library shelf space. In this way the library keeps the printed issues unbound and circulates them in that form for from two to three years, which corresponds to their period of greatest use. When copies wear out or are not called for frequently, microfilm is substituted.

Sales are restricted to subscribers and film copy is distributed only at end of the volume year. Information is available from University Microfilms, 313 N. First St., Ann Arbor, Mich.

SFSA Publishes Steel Castings Data Chart

Engineering data on steel castings is incorporated in a chart published by the Steel Founders' Society of America as an aid to design engineers.

The chart comprises a tabular listing of general engineering types of steel castings, classified according to tensile strengths. Essential data include engineering and design applications, current specifications and typical specifications for special tensile grade requirements. Also included are data on specific yield point, elongation, reduction of area, hardness and impact evaluations, endurance, modulus of elasticity, machineability and heat treatments.

PERSONALITIES

(Continued from Page 69)

field, Iowa. Mr. Farley was formerly in charge of sales for the Wilhelm Engineering Co. and was sales engineer for the Reynolds Metals Co. and the Baldwin Locomotive Works' Testing Machine Dept. Mr. Farley will call on prospective jobbing gray iron casting customers.

R. J. Leckrone, for 20 years active in sales and design of rolling mill equipment, has been appointed chief engineer for the Mackintosh-Hemphill Co., Pittsburgh. Mr. Leckrone's broad experience in engineering rolling equipment includes three years spent in Russia as chief engineer in charge of American specialists in design of rolling mill equipment for Russia at Kramatorskie in the Ukraine.

OBITUARIES

Lewis D. McClaren, 61, manager of the By-Product Coke Dept. of the Republic Coal and Coke Co., Chicago, died January 17 in Henrotin Hospital, Chicago. Mr. McClaren was a member of A.F.S. and the American Coke and Coal Chemical Institute, as well as of the Masons, Shriners and Chicago Athletic Club.

William E. Brewster, 60, died December 19. Retired January 1, 1949, as manager of operations, Wisconsin Steel Div., International Harvester Co., he recently returned from Europe where he was special technical consultant on steel plant operations for the U. S. military government in Austria. He was born in Iron Mountain, Mich., and had been with International Harvester since his graduation from Yale University in 1910.

James Lauder, vice-president of the MacCleod Co., Cincinnati sandblast equipment manufacturing and engineering firm, died December 5.

Euclid E. Griest, 61, formerly manager of the Foundry Division and vice-president of Lehigh Foundries, Inc., Easton, Pa., until March of last year when he became inactive because of poor health, died Christmas Day in Chicago. Starting as a design engineer for Crucible Steel Co. in 1907, Mr. Griest worked for the Erie and Pennsylvania Railroads, the Chicago Railway Equipment Co. and the Fort Pitt Malleable Iron Co. prior to joining Lehigh in 1939. At the time of his retirement from active service with the company in March of last year, Mr. Griest was attached to Lehigh's Mechanical Refrigeration Division at Lancaster, Pa. He was a graduate of Purdue University.

Herbert Larson, foundry superintendent for the Lake Street Plant of the Minneapolis-Moline Co., Minneapolis, died November 20. Mr. Larson started his foundry career in 1900 with Gillette & Eaton, Lake City, Minn., joining Minneapolis-Moline in 1919. He had been foundry superintendent there since 1927.

FIRM FACTS

Tincher Products Co., Chicago, announces the removal of its offices to 5611 W. Waveland Ave., Chicago. Offices were formerly located at 1715 W. Lake St., Chicago, and manufacturing facilities at 115 Monterey Ave., Villa Park, Ill. Both will be consolidated in the company's new building at the Waveland Ave. address in Chicago.

Richmond Welding Supply Co., Richmond, Va., has been appointed an authorized dealer for the **Air Reduction Sales Co.**, New York. A new organization, the Richmond Welding Supply Co. will be owned and operated by John G. Jones and Arnold Ruedy.

Federal Foundry Supply Co., Cleveland, has moved its Milwaukee office to 421 E. Wells St. and has changed its telephone number to Broadway 2-0066. E. C. Meagher continues as Wisconsin representative for the company, which will continue to warehouse goods in Milwaukee.

American Air Filter Co., Inc., Louisville, Ky. manufacturer of air filters and dust collectors, has merged with the **Herman Nelson Corp.**, Moline, Ill., manufacturer of heating and ventilating equipment. The Nelson Corp., which will henceworth operate as the **Herman Nelson Division of American Air Filter Co., Inc.**, will continue to maintain its headquarters and facilities in Moline. The merger company's principal offices and headquarters will be in Louisville. W. G. Frank, executive vice-president, and Richard H. Nelson have been elected directors of the combined firm; Richard H. Nelson and Robert W. Nelson, vice-presidents; and E. G. Mason assistant secretary and assistant treasurer of the combined organization.

American Standards Association announces the election of three new members to its Board of Directors for three years. They are: **Maurice Stanley**, chairman of the Board, Fafnir Bearing Co., representing the Anti-Friction Bearing Manufacturers' Association; **B. S. Voorhees**, vice-president of the New York Central System, representing the Association of American Railroads; and **Col. J. G. Vincent**, vice-president, Packard Motor Car Co., representing the Automobile Manufacturers Association.

Correction

An item in the December, 1949, issue of AMERICAN FOUNDRYMAN stated that Wayne H. Gunselman will head the building and expansion program of Mohawk Foundries, Inc., Buffalo, N. Y. The correct address of Mohawk Foundries, Inc., is Cleveland, Ohio.

ABSTRACTS

Abstracts below have been prepared by Research Information Service of The John Crerar Library from current American and foreign literature. For literature searches and translations of technical, industrial, and scientific literature, and photostats and microfilm, write to: Research Information Service, The John Crerar Library, 86 East Randolph Street, Chicago 1, Illinois.

Elevated Temperature Service

11—Internal Stresses. F. G. Sefing, "Designing Metal Parts for High Temperature Service," *Canadian Metals & Metallurgical Industries*, vol. 12, Nov. 1949, 14-17, 36.

The effects of elevated temperatures upon the metal structure and some of the mechanical properties of various metals and alloys are given in graphical and tabular form. The effect of temperature and design upon the internal stresses are discussed along with their effect on abrasion and wear resistance. Relief of internal stresses caused by casting, forging, machining, cold forming, welding, etc. by annealing is outlined.

Magnesium-Rare Earth Alloys

12—Properties. Thomas E. Leontis, "The Properties of Sand Cast Magnesium Rare Earth Alloys," *Journal of Metals*, vol. 7, Dec. 1949, pp. 968-982.

All the rare earth metals investigated enhance the strength, hardness, and creep resistance of magnesium at room and elevated temperatures. There are, however, marked differences in the degree to which they improve these properties.

Results of this investigation have shown that considerably higher elevated temperature properties can be developed in magnesium-didymium and magnesium-cerium free mischmetal alloys than those exhibited by magnesium-mischmetal alloys. At 400 F, for example, the properties of magnesium-didymium alloys are 20 to 50 per cent higher than those of magnesium-mischmetal alloys. Several tables, graphs, and photomicrographs are included.

Nodular Iron

13—Comparative Properties. T. E. Eagan and J. D. James, "A Practical Evaluation of Ductile Cast Iron," *Iron Age*, vol. 164, Dec. 8, 1949, pp. 75-79, Dec. 15, pp. 77-82.

Results are given of several tests performed on full-sized castings as well as laboratory specimens of ductile cast iron. On some tests the mechanical properties of ductile cast iron were compared with other materials such as forgings, gray iron, alloy iron, cast steel, and a patented inoculated iron.

Approximate analysis of the ductile cast iron used in the experiments was: TC, 3.39 per cent; Si, 2.19; Mn, 0.61; P, 0.10; S, below 0.01, Ni, 1.62; Mg, 0.070—

0.105. The tensile strength of this material in the as-cast condition varied from 88,100 psi for a one-inch section down to 65,500 psi for a six-inch section. The mechanical properties can be altered by a special annealing cycle with the biggest difference occurring in the elongation, the Brinell hardness, and the impact strength. In the latter property—determined on a modified Izod test (0.798 in. bar, 120 ft lb)—the impact strength increased from 50-90 ft lb to 120 plus. That is, the test piece withstood several blows without breaking.

A series of bursting and endurance tests on actual size parts is described and the results tabulated. Pressure vessels of four different materials were burst hydraulically using a special high pressure pump. Bursting pressures (psi) reported for gray iron (class 40), alloy iron, cast steel, and ductile cast iron are 7,200, 8,250, 16,200, and 14,750, respectively.

Product Design

14—ALUMINUM DIE CASTINGS. "Design of a Portable Saw," *Die Castings*, vol. 7, Dec. 1949, pp. 32-34, 55-56.

The article discusses the part played by an industrial designer in the development of a new six inch portable saw. The product designer takes the engineer's mechanism and presents it to the consumer in such a way that he is impressed with its efficiency, beauty, and desirability. Die castings made of aluminum were selected for the housing parts because they offered the most efficient and economical method of production.

Treatment for Bentonite

15—IMPROVING SAND PROPERTIES. A. Bichler, "Modified or Unmodified Bentonites?" *Hutnicke Listy*, vol. 4, Oct. 1949, pp. 317-318 (in Czech).

Bentonites, recently discovered in Czechoslovakia, were tested as a binding material for foundry sand. In the author's opinion the qualities of bentonites are considerably improved by a preliminary processing. Laboratory and foundry experiments showed that the mechanical properties of the sand mold are better, and the percentage of rejected castings is lower, when modified bentonite is employed—as compared to the natural sand material.

Analyzing Ductile Iron

16—MAGNESIUM AND CERIUM DETERMINATION. J. I. Rozsa, "Spectrographic Analysis of Ductile Cast Iron," *Iron Age*, vol. 164, Dec. 22, 1949, pp. 73-75.

Application of spectrographic analysis for low cost determinations of magnesium and cerium in ductile cast iron is described and data are presented illustrating the accuracy and reproducibility of results with this method.

"Spectrographic Methods for Determining Magnesium in Nodular Iron," *ASTM Bulletin*, vol. 162, Dec. 1949, pp. 69-72.

A procedure is described for determining magnesium in nodular iron. This consists of two parts: (1) A spectrographic solution method of analyzing metal rods

to be used as standards for the control analysis; (2) A technique for determining magnesium as a part of the customary spectrographic analysis of cast iron rods or pins.

Ferritic Nodular Iron

17—Large Castings. "The Production of Massive Castings of Ferritic Nodular Cast Iron." *La Fonderie Belge*, May-Aug., 1949, pp. 31-37 (in French).

Results of experiments are presented on the production of massive castings of ferritic nodular cast iron using magnesium-silicon alloys. Since these alloys have a low specific gravity, they float on the surface of the liquid metal and have a tendency to burn. Therefore, a special technique is required in their addition to the metal. The structure of the product and its mechanical properties are influenced by the size of the castings.

Precision Investment Casting

18—Time-saving Technique. P. E. Gainsbury, "Precision Casting—A Method of Accelerating the Setting of Investments," *Metal Industry*, vol. 75, Dec. 9, 1949, pp. 497.

The author describes the two main types of investment castings. In the type used for casting high-melting point alloys, the Mond Nickel Co., London, has devised a special technique which reduces the hardening time of slow setting investments. The technique essentially involves the use of a plaster of Paris molding flask with a $\frac{1}{2}$-in. wall thickness in place of one of metal or cardboard. This absorbs the excess liquid from the investment slurry, causing a rapid hardening of the mold. With small molds the setting time may be cut to five minutes.

Malleable and Gray Iron

19—Influence of Silicon. J. E. Rehder, "Cooling of Blackheart Malleable Iron," *Canadian Metals & Metallurgical Industries*, vol. 12, Dec. 1949, pp. 20-23.

A presentation is given of the results obtained during the slow cooling of iron-carbon-silicon alloys such as blackheart malleable iron and gray cast iron. The effect that the silicon content has on the critical temperature range is clearly shown and described. Several photomicrographs, graphs and tables are included.

Save Tooling Costs

20—Replace Stamping. "Dependable Driving and Braking Mechanism Built with Die Castings." *Die Castings*, vol. 7, Dec. 1949, pp. 28-31, 54.

A wire recording unit is illustrated along with photographs of several of the die cast parts which go into the assembly. In a large piece, measuring $14\frac{3}{4}$ in. x 11 in., a saving was realized in the tooling costs when made as a die casting instead of a stamping. In addition, practically no secondary machining other than the drilling, tapping, or reaming of a few holes is needed and the part can be sprayed with a baking enamel without any preliminary polishing or treatment. Operating principles of the recorder are also discussed.

Index to Advertisers

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